DOCUMENT RESUME

ED 174 766 CE 022 020

AUTHOR Forgione, Pascal D., Jr.; Kopp, A. Lee
TITLE Curriculum Development Needs for Vocational Education: New and Changing Occupational Areas.
INSTITUTION Ohio State Univ., Columbus. National Center for Research in Vocational Education.
SPONS AGENCY Bureau of Occupational and Adult Education (DHEW/OE), Washington, D.C.
PUB DATE Jan 79
CONTRACT 300-78-0032
NOTE 313p.

EDRS PRICE MF01/PC13 Plus Postage.
DESCRIPTORS *Curriculum Development; Educational Planning; Employment Opportunities; Employment Projections; *Energy; *Health Services; Information Needs; *Needs Assessment; Occupational Information; Occupational Surveys; Trend Analysis; *Vocational Education
IDENTIFIERS Long Term Health Care; *Occupational Safety and Health

ABSTRACT

This report describes a study conducted to develop and provide information that would assist national vocational education planners and policy makers in selecting national priorities for curriculum development in specific occupational areas that are changing or are new. Chapter 1 describes the problem and discusses three difficulties in determining the needs for curriculum development. Chapter 2 presents the objectives of identifying the needs for curriculum development in new and changing occupational areas, and it details the three procedures used to meet these objectives. Chapter 3 reports the findings on the occupational area of long term health care, including an anlaysis of factors influencing the economic growth of occupations in the area and detailed reports on five specific occupations. Chapter 4 reports the findings from the ongoing investigations of three other occupational areas (allied health, energy, and occupational health and safety), including an analysis of economic influences and reports on five additional occupations. Chapter 5 provides a general summary for the report. (JH)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED174766

OCT 17 1979

CURRICULUM DEVELOPMENT NEEDS FOR VOCATIONAL EDUCATION: NEW AND CHANGING OCCUPATIONAL AREAS

By

Pascal D. Forgione, Jr.
A. Lee Kopp

The National Center for Research in Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, Ohio 43210

January 1979

CE 022 020

U S DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

THE NATIONAL CENTER MISSION STATEMENT

The National Center for Research in Vocational Education's mission is to increase the ability of diverse agencies, institutions, and organizations to solve educational problems relating to individual career planning, preparation, and progression. The National Center fulfills its mission by:

- Generating knowledge through research
- Developing educational programs and products
- Evaluating individual program needs and outcomes
- Installing educational programs and products
- Operating information systems and services
- Conducting leadership development and training programs

This publication was prepared pursuant to Contract No. OE 300780032 with the Bureau of Occupational and Adult Education, U. S. Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under government sponsorship are encouraged to freely express their judgment in professional and technical matters. Points of view or opinions do not, therefore, necessarily represent official Bureau of Occupational and Adult Education, U. S. Office of Education position or policy.

U. S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE

U. S. Office of Education

FOREWORD

The need for more adequate information upon which to base policies, plans and priorities in vocational education is underscored in the Education Amendments of 1976. Technological advancements and changing societal demands present severe difficulties in designing and delivering vocational programs that meet present labor market needs and are responsive to future employment opportunities. One kind of necessary policy information consists of the needs for curriculum development in new and changing occupational areas. This report, developed by the National Center under its contract with the Bureau of Occupational and Adult Education, U.S. Office of Education, provides such an analysis for national planners and policy makers.

The National Center expresses its appreciation to the many individuals who contributed to this report. Special thanks are extended to Pascal D. Forgione, Jr., project director, and A. Lee Kopp, program associate, who prepared this report, and to Edward J. Morrison who supervised the report's development and preparation.

A special indebtedness is acknowledged to many consultants for their guidance and willing assistance throughout: Max Carey, Bureau of Labor Statistics; Donald Drewes, Conserva, Inc.; George Lowry, Iowa State Department of Education; Jeffrey Windom, Ohio State Occupational Information Coordinating Committee; Joseph Kadish, Bureau of Health Manpower; Ruth-Ellen Ostler, New York State Education Department; Frances Glee Saunders, Bureau of Occupational and Adult Education; and Sylvia Upp, The Ohio State University. A Task Force on Long Term Health Care, chaired by Warren Perry, State University of New York at Buffalo, provided substantial contributions and several members provided written summaries of task force findings: Joan Andrews, Visiting Nurse Service-Summit County (Ohio); Thomas Aschenbrener, Bureau of Health Manpower; Sarah Dean, Corporation for Health Education in Appalachia Ohio; Gloria Morrow, American Health Care Association; Nancy Robinson, National Council for Homemaker-Home Health Aide Service, Inc.; and Sean Sweeney, Administration on the Aging. William Ashley of the National Center, Wilma Gillespie, University of Louisville, and Richard Wilson, American Association of Community and Junior Colleges, made valuable contributions in their critical reviews of the manuscript prior to final revision.

Robert E. Taylor
Executive Director
The National Center for
Research in Vocational
Education

TABLE OF CONTENTS

	Page
LIST OF FIGURES AND TABLES	xi
PART ONE: OVERVIEW OF THE STUDY	1
CHAPTER I: INTRODUCTION	3
Background	3
Statement of the Problem	4
Purpose of the Study	7
References	11
CHAPTER II: METHODS	13
Design of the Study	13
Research Procedures	16
First Procedure: Identifying and Selecting New and Changing Occupational Areas Within the Scope of Vocational Education	16
Second Procedure: Conducting an Analysis of a High Priority New and Changing Occupational Area	22
Third Procedure: Acquiring, Organizing, and Describing Information on New and Changing Occupational Areas	27
Fourth Procedure: Matching Available Curriculum Materials with New and Changing Occupational Areas	28
References	30

TABLE OF CONTENTS (continued)

	Page
PART TWO: FINDINGS OF THE STUDY	33
Introduction	35
CHAPTER III: LONG TERM HEALTH CARE	37
Institutional Long Term Health Care	37
Conditions Affecting the Nature and Growth of Institutional Long Term Health Care	38
Opportunities for Curriculum Development in Institutional Long Term Health Care Occupations	42
Long Term Care Technician	42
Therapeutic Recreation Leader	46
Nursing Home Administrator	48
Summary	50
In-Home Long Term Health Care	51
Conditions Affecting the Nature and Growth of In-Home Long Term Health Care	51
Opportunities for Curriculum Development in In-Home Long Term Health Care Occupations	55
Homemaker-Home Health Aide	58
Supplementary Services Assisting	65
Summary	68
References	70

TABLE OF CONTENTS (continued)

Page

CHAPTER IV: OTHER ALLIED HEALTH, OCCUPATIONAL SAFETY AND HEALTH, AND ALTERNATIVE ENERGY AREAS 75

Other Allied Health Areas. 75

Conditions Affecting the Nature and Growth of Other Allied Health Areas 75

Opportunities for Curriculum Development in Other Allied Health Areas 77

Multi-Competency Technician. 78

Diagnostic Medical Sonographer 80

Summary 82

Occupational Safety and Health Area. 82

Conditions Affecting the Nature and Growth of the Occupational Safety and Health Area 82

Opportunity for Curriculum Development in the Occupational Safety and Health Area. 83

Industrial Hygiene Technician. 83

Summary 84

Alternative Energy Areas 85

Conditions Affecting the Nature and Growth of the Alternative Energy Areas. . . 85

Opportunity for Curriculum Development in the Alternative Energy Areas 86

TABLE OF CONTENTS (continued)

	Page
Solar Mechanic and Solar Technician	86
Energy Efficiency	94
Nuclear Energy	95
Coal Energy	96
Summary	101
References	103
CHAPTER V: GENERAL SUMMARY	109
Plans for Next Year	112
APPENDICES	115
A State Approaches for Identifying Curriculum Development Needs in Vocational Education	117
A-1 Overview of Five State Approaches for Identifying Curriculum Development Needs in Vocational Education.	118
A-2 Identifying Vocational Education Occupational Training Needs in Florida	120
A-3 Current and Future Employment Opportunities In New and Emerging Occupations within Illinois	123
A-4 The Iowa Career Education Needs Information	129
A-5 Occupational Program Planning in Oklahoma	134
A-6 Educational Forecasting or Job Opportunities Forecasting in the State of Washington.	138

TABLE OF CONTENTS (continued)

		Page
B	Project Consultants and Meetings	153
B-1	Consultant Review Panel Meeting	154
B-2	Health Planning Panel Meeting	155
B-3	Task Force on Long Term Health Care Settings: Participants	156
B-4	Task Force on Long Term Health Care Settings: Agenda	160
B-5	Final Report External Consultant Reviewers	162
C	Definition of Long Term Health Care Terminology	163
D	Forces, Factors, and Trends Impacting on Long Term Health Care Settings	167
E	Recently Adopted and Projected Occupational Programs in Post-Secondary Schools	171
E-1	Programs in Fiscal Year 1976-77	172
E-2	Programs in Fiscal Year 1977-78	180
E-3	Programs in Fiscal Year 1978-79	197
E-4	Programs: Current	214
E-5	Programs: Projected	223
F	New and Changing Programs and Priorities Identified from Community College Catalogues and State Post-Secondary Agencies	239
G	National Network for Curriculum Coordination in Vocational and Technical Education (NNCCVTE) Responses to Request for Curriculum Information	241

TABLE OF CONTENTS (continued)

		Page
H	Medicare, Medicaid, and Health Insurance: Background Information	247
I	Government Regulation of Long Term Health Care: An Historical Overview	249
J	Continuing Education of Long Term Health Care Personnel.	251
K	Recognized Accrediting Agencies for Allied Health Education.	255
L	Education Opportunities in Industrial Hygiene.	261
M	Existing Training Programs of Diagnostic Medical Ultrasound, 1977	263
N	Vocational/Technical Schools/Courses Related to Solar Energy.	275
O	Nuclear Energy Programs.	285
P	Labor Structure in Coal Mining	287
Q	Coal Mining and Related Programs	295

LIST OF FIGURES AND TABLES

Figure		Page
II-1	Identifying Needs for Curriculum Development in Vocational Education for New and Changing Occupational Areas	14
Tables		
II-1	Settings and Target Populations for Long Term Health Care.	24
II-2	Categories of Occupational Information Needed for New and Changing Occupational Areas.	27
III-1	Occupations Employed in Institutional Long Term Health Care.	40
III-2	Long Term Care Estimated Supply and Potential Need, for Calendar Year 1976 (Adults in millions)	52
III-3	Comparison of Titles XVIII, XIX and XX of the Social Security Act	54
III-4	Continuum of In-Home Health Services for the In-Home Long Term Health Care Setting.	57
III-5	Homemaker - Home Health Aide Activities.	60
III-6	Projections and Requirements for Homemaker-Home Health Aides: 1980, 1985, and 1990.	63
IV-1	Total Employment by Occupation for Health Technologists and Technicians.	76
IV-2	Estimated Need for Energy Workers to the Year 2000.	87
IV-3	Predominant Solar Mechanic Tasks	88

LIST OF FIGURES AND TABLES (continued)

Tables		Page
IV-4	Predominant Solar Technician Tasks	89
IV-5	Comparisons of Studies for Projected Human Resource Needs in Solar Energy	91
IV-6	Projected Employment Requirements for Three Outlook Levels, 1985	97
IV-7	Current Coal Mining Related Training Efforts Funded by DOL in Region VIII	100

PART ONE

OVERVIEW OF THE STUDY

CHAPTER I: INTRODUCTION

Background

Today, more than ever before, vocational education must be responsive to the employment market. Yet rapidly changing occupational structures, caused by advances in technology and societal demands, make it increasingly difficult to design and deliver programs which prepare students both to enter jobs that currently exist and to cope with future changes in labor market demand. The need for more adequate information on the changing employment requirements in planning vocational education programs has been cited in two major federal education enactments. The 1968 Amendments to the Vocation Education Acts assigned a high priority to the goal of "providing ready access to vocational training . . . which is realistic in the light of the actual or anticipated opportunities for gainful employment." The Amendments further recognized that information on new and changing occupations is an essential component in the process of planning vocational education (Section 132), and they authorized funding for the development of curricula for these new and changing occupations (Section 189). More recently, the Education Amendments of 1976 also included provisions for improving information-based planning and policy development in vocational education. This legislation provided funding for research, for development and dissemination of curriculum materials for new and changing occupational areas (Section 131 and 133), and for the development and implementation of occupational information systems designed to meet the needs of training programs at the national, state, and local levels (Section 161).

The National Center for Research in Vocational Education, under its contract with the Bureau of Occupational and Adult Education (BOAE), U. S. Office of Education (USOE), is assigned one responsibility directly traceable to the legislative concern for development of relevant training programs in vocational education: to assemble and present information to assist BOAE/USOE in setting national priorities for curriculum development in specific occupational areas that are new and changing (U.S. Office of Education 1977).

Statement of the Problem

The need for more adequate information upon which to base policies, plans, and priorities in vocational education is underscored in the Education Amendments of 1976. One kind of necessary information consists of the needs for curriculum development in new and changing occupational areas. This information would enable planners of curricula in vocational education to respond more quickly and precisely to the employment needs of both students and employers. There are, however, several difficulties in determining the needs for curriculum development in new and changing occupational areas.

One problem is the fact that these target areas have complicated curriculum development. Curriculum development for vocational education generally consists of three basic steps:

1. analysis of student needs and labor market demand;

2. analysis of existing jobs to describe their constituent tasks and identify the skills and competencies needed to perform them; and

3. development of curricula to provide training for the skills and competencies required (Nelson, 1978, p. 1).

Drewes, et al., have pointed out in a recent study, however, that these steps are not easily followed in developing curricula for new and changing occupations:

> Occupational functions are often hazily defined during the process of development, thus employers tend to disagree as to the duties required and whether they actually comprise a distinct occupation. This creates problems not only for the identification of new and changing occupational areas, but also for developing or locating curriculum materials. Additionally, conventional procedures for estimating employment demand are generally not applicable to new and changing occupations (Drewes, et al., 1978, p. 1-2).

A second problem is that shifting occupational patterns and short term cyclical trends make it difficult to adapt existing vocational programs to new and changing occupations. Traditional methods for surveying employers are inadequate for identifying new and changing occupations. Various descriptions of new and changing occupations by employers, industries, and states impede identifying them and estimating the demand for them. Moreover, major national sources of occupational information, such as the

U. S. Bureau of Labor Statistics' Industry-by-Occupation Matrix and Occupational Outlook Handbook, use systems of occupational classification that emphasize existing occupational titles at the expense of new and changing ones. Other standard research sources proved inadequate because they overlooked the important distinction between identifying new and changing occupational areas and identifying curriculum development needs for those occupational areas. The lack of differentiation can contribute to serious methodological complications. For example, the following definition of a new and emerging occupation, presented in a recent national study, confused this critical distinction, and therefore flawed the conceptual framework for achieving its objectives:[1]

> A new and emerging occupation (NEO) is one which has come into existence in the past ten years in skilled or technical areas, for which there is an established demand, or basis for projecting growth, and a shortage of trained labor, and for which no public vocational education is available (Meleen, et al., 1976, p. 4).

Clearly, the determination as to whether an occupational area is new and changing or emerging should be a judgment independent of whether curriculum exists, or does not exist; however, the presence or absence of adequate curriculum is critical to the identification of curriculum development needs for new and changing occupational areas. (In the first section of Chapter II, Design of the Study, an illustration of the three-step conceptual framework developed for this investigation is provided.)

A third reason that standard information sources proved inadequate is that they are seldom both national and local in scope. Nationwide studies of new and changing occupations may often fail to satisfy a state's particular needs since the criteria for consideration of occupational areas include some standard of nationwide demand and availability of training.[2] Conversely, some investigations may be limited to those

---

[1]This national study, which was sponsored by the U. S. Office of Education (USOE) in 1976, had two purposes: first, to develop and document a methodology and a process for identifying new and emerging occupations at the skilled and technical levels, and second, to apply the process to identify specific examples of new occupations for which USOE might develop curricula at the National level (Meleen, et al., 1976, p. 1).

[2]For example, in the Meleen study, the appropriate criteria used for assessing an occupation's national viability were a minimum of two thousand job openings per year for the next five to ten years and the absence of public vocational education programs.

occupations that are new and changing from the state's perspective.[3] In addition, states can initiate surveys, such as Iowa's CENSIS II survey (see Appendix A-4), to assess the needs of all incumbent employers of a certain size, even though this kind of project is not feasible on a national level.

Three other problems have been identified as contributing to the difficulties of designing an approach for the identification of curriculum development needs for new and changing occupational areas (Drewes, et al., 1978). First, employment needs are difficult to identify and to assess because of the variety of developmental stages through which new and changing occupations progress. Second, it is difficult to determine the point in the developmental process at which intervention by vocational education is appropriate. And third, the complex trends that influence new and changing occupational areas preclude the designing of a developmental model which applies to all occupations.

Even after new and changing occupational areas have been identified, numerous questions must be answered before curricula can be devised and implemented. Requirements for performance must be analyzed, qualified staff must be recruited, and, most importantly, the target audience and the level of instruction must be decided. Given the projected demographic shift in the population of 14 to 24 year olds, (that is, a decline of 3.2 million between 1980 and 1985),[4] a high priority was assigned to identifying occupations that offered possibilities for training the postsecondary and adult populations, especially clients served by CETA (Comprehensive Employment and Training Act).

---

[3]For example, Drewes, et al., (1978) determined that there was a viable demand in Illinois for Swine Confinement Facility Assistant Manager, despite the fact that the national growth prospects for this occupation were not sufficient to meet the criterion of national demand. Appendix A-3 describes the methods used and findings of this state-oriented study of new and emerging occupations. In addition, Appendix A-1 describes the different approaches used by five states (Florida, Illinois, Iowa, Oklahoma and Washington) for identifying curriculum development needs in Vocational Education. Appendices A-2 through A-6 provide brief synopses of each state's approach.

[4]In his recent analysis of changes in occupational characteristics, Leonard Lecht concluded that "demographic changes in the next decade are expected to lessen the importance of the high school age group as the primary audience for vocational education and to increase the importance of adults with labor force experience as the source of enrollment growth " (Lecht 1976, p. 2).

Purpose of the Study

In January 1978, The Center for Vocational Education, the Ohio State University, was designated as the National Center for Research in Vocational Education. One of its tasks was:

> To develop and to provide information that will assist in selecting national priorities for curriculum development in specific occupational areas that are changing or new.

This task forms the scope of work for this project.

Before the method of this study is described, several key terms should be defined. "New and changing occupational areas"[5] are those characterized by growth in employment over the last decade caused by:

---

[5] The term, occupational area, is used in this report to refer to a larger class of occupations. It is applied much in the same way as the Bureau of Labor Statistics (BLS) distinguishes between an occupational group level, for example, construction or professional occupations, and a detailed occupational title level, for example, carpenter or accountant. It needs to be recognized that there presently is no standard or commonly accepted terminology for differentiating between these two terms. (Carey 1978).

The following definitions are provided for four commonly used occupational terms. For the purposes of this study, the finest occupational level is referred to as an occupation.

Industry. All establishments engaged in producing similar products or providing similar services (Miernyk 1971).

Occupation. An occupation is a group of similar jobs found in several establishments (Shartle 1959).

Job. A job is a group of similar positions in a single plant, business establishment, educational institution, or other organization. There may be one or many persons employed in the same job (Shartle 1959).

Position. A position is a group of tasks performed by one person. There are as many positions as there are workers in the organization (Shartle 1959).

1. the creation of new industries or occupations (for example, the computer industry with related new occupations such as the computer programmer);

2. the significant restructuring of existing occupations (for example, the physician's assistant); and

3. modifications of required skills in existing occupations (for example, word processing).

The changes that bring about these new occupations include:

1. development of new technologies, such as laser technology;

2. changes in social concerns, such as the emphasis on environmental protection;

3. changes in national needs, such as the need for alternative sources of energy;

4. development of new market opportunities, such as those for a disco dance instructor; and

5. emergences of economic conditions which motivate industry to streamline operations for increased efficiency, such as cost containment efforts in the health industry.

Some technological advancements may produce changes in existing occupations. New occupations, such as the laser or computer technologies, seldom arise overnight. More often they are the result of gradual changes within an existing occupational area or industry.

"Curriculum development" for these new and changing occupations is defined as the process of identifying what is to be learned (the content) and how it is to be presented (the instructional methods). Identification of new and changing occupational areas does not automatically define the need for curriculum development. For instance, curriculum content and instructional materials, media, and methods may be readily available for some new and changing occupational areas, while others may require no formal vocational preparation to reach entry-level skill. Still other occupational areas may, indeed, require formal training, but at the baccalaureate or higher level. In the latter case, the curriculum development need is not a need of vocational education but a need of higher education.

"Vocational education," as the term is used in the 1968 Amendments,[6] must meet the following four criteria:

1. type of preparation--skilled or technical training for purposes of attaining entry level, retraining, or upgrading;

2. level of preparation--secondary or post-secondary, excluding professional level training requiring a baccalaureate or higher degree;

3. length of preparation--minimum of two months for upgrading or six months for a new trainee, and any nonprofessional program at less than a four year college level; and

4. probability of placement--favorable competition for jobs in fields related to training of graduates or completers.

---

[6] In Title I, Part A, Section 108, of the 1968 Amendments, vocational education is defined.

> The term "vocational education" means vocational or technical training or retraining which is given in schools or classes (including field or laboratory work and remedial or related academic and technical instruction or incident thereto) under public supervision and control or under contract with a State board or local educational agency and is conducted as part of a program designed to prepare individuals for gainful employment as semiskilled or skilled workers or technicians or subprofessionals in recognized occupations and in new and emerging occupations or to prepare individuals for enrollment in advanced technical education programs, but excluding any program to prepare individuals for employment in occupations which the Commissioner determines, and specifies by regulation, to be generally considered professional or which requires a baccalaureate or higher degree (U.S. Congress 1968).

The following chapters describe the methodology and findings of this study. * Chapter II presents the objectives of identifying the needs for curriculum development in new and changing occupational areas, and it details the three procedures used to meet these objectives. Chapter III reports the findings on the fully researched occupational area of long term health care, including an analysis of factors influencing the economic growth of occupations in the area and detailed reports on five specific occupations. Chapter IV reports the findings from the ongoing investigations of three other occupational areas (allied health, energy, and occupational health and safety), including an analysis of economic influences and reports on five additional occupations. Chapter V provides a general summary for the report.

References

Carey, Max L. Bureau of Labor Statistics, Washington, D. C. Personal conversations between April and December 1978.

Drewes, D. W.; Spetz, Sally H.; Heath, Walter D.; and Katz, Douglas S. Current and Future Employment Opportunities in New and Emerging Occupations within Illinois. Raleigh, North Carolina: CONSERVA, Incorporated, August 31, 1978.

Lecht, Leonard A.; with Matland, Marc and Rosen, Richard. Changes in Occupational Characteristics: Planning Ahead for the 1980's. New York: The Conference Board, Inc., 1976.

Meleen, P. S.; Gordon, A. K.; Livesay, S.; Donovan, J.; Shuchat, J.; and Bloom, S. Planning for Vocational Education: New and Emerging Occupations. Belmont, Massachusetts: Contract Research Corporation, 1976.

Miernyk, W. H. Economics. New York: Random House, 1971.

Nelson, Orville. "Emerging Occupations," The Wisconsin Vocational Educator. 1978, 4, 1-3.

Shartle, C. L. Occupational Information. (Third edition). Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1959.

U. S. Congress. Education Amendments of 1976. Public Law 94-482, Enacted October 12, 1976. Washington, D. C.: U. S. Government Printing Office, 1976.

U. S. Congress. Vocational Education Amendments of 1968. Public Law 90-576, Enacted October 16, 1968. Washington, D. C.: U. S. Government Printing Office, 1968.

U. S. Office of Education, Department of Health, Education and Welfare. "Request for Proposal: A National Center for Research in Vocational Education." Closing date September 16, 1977. Washington, D. C. RFP Number 78-2.

CHAPTER II: METHODS

Design of the Study

To be effective in meeting the needs of students and employers, vocational education must adjust its instruction to significant changes in occupational opportunities. To assist in this enterprise, this project was designed as a cyclical process with four major components:

1. identification of occupational areas that are new and changing;

2. determination of new and changing occupational areas that fall within the scope of vocational education;

3. location of curricula that are appropriate for the new and changing occupational areas; and

4. development of information that facilitates the selection of national priorities for curriculum development in new and changing occupational areas.

The process used to identify national needs for curriculum development can be conceptualized in three steps (see Figure II-1). First, new and changing occupational areas had to be identified. (These are represented by the circle A in Figure II-1.) For the purpose of this study, new and changing occupational areas had to meet the following three criteria:

1. high employment growth[7] on a national level;

2. emergence over the last decade; and

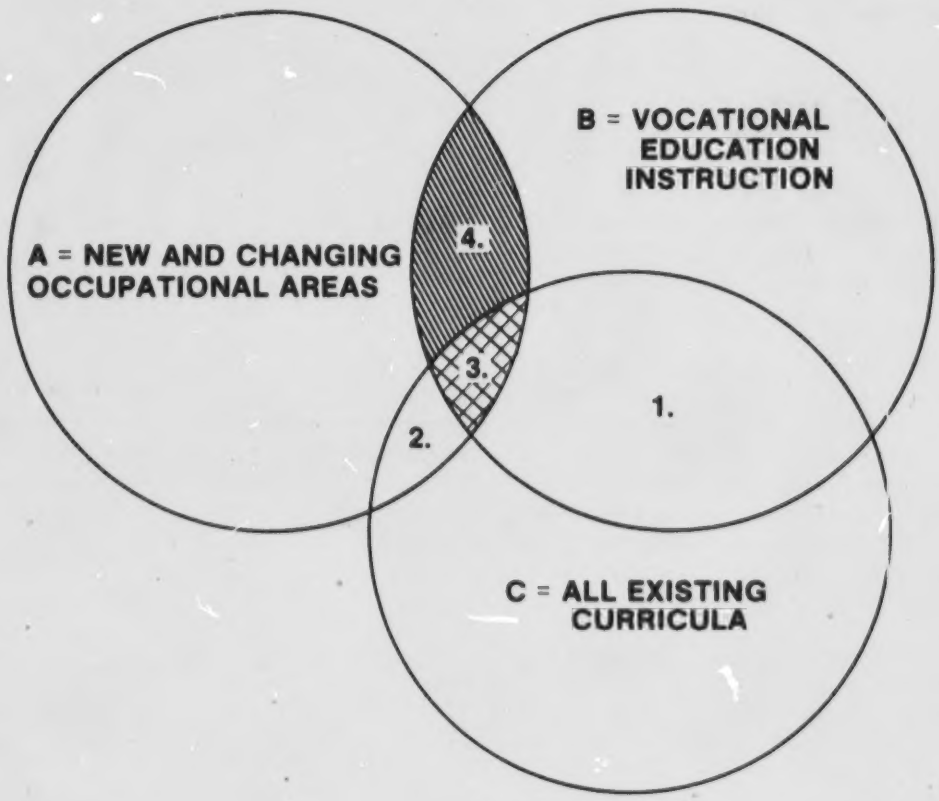
3. development arising from: (a) the creation of a new industry, occupational area, or occupation; (b) significant restructuring of an existing occupational area or occupation; or (c) modifications in some requirements in an existing occupational area or occupation.

---

[7]Anticipated annual job openings are determined by two factors: employment growth (new job openings) and the replacement of attrition losses.

Figure II-1

Identifying Needs for Curriculum Development in Vocational Education for New and Changing Occupational Areas



Key

1. Existing curricula for established occupational areas that fall within the scope of vocational education instruction.

2. Existing curricula for new and changing occupational areas that do not fall within the scope of vocational education instruction.

3. Existing curricula for new and changing occupational areas that fall within the scope of vocational education instruction.

4. New and changing occupational areas that fall within the scope of vocational education instruction but for which no adequate curricula exist.

Second, because preparation for employment in new and changing occupational areas requires preparation ranging from basic on-the-job retraining to a graduate or post-graduate degree, each candidate occupational area had next to be assessed in terms of whether it fell within the scope of vocational education instruction. Vocational education is defined as skilled or technical training (usually requiring a minimum of two months for upgrading or six months for basic training) and any non-professional program at less than a baccalaureate level designed to prepare individuals for employment.[8] The scope of vocational education instruction is represented by circle B in Figure II-1.

The third and final step required a search of existing curricula in vocational education to find those that might satisfy the instructional needs of the new and changing occupational areas. Circle C in Figure II-1 represents the population of existing curricula or training programs.

Of the four possible products of this research activity, three of these (which are designated by numbers 1, 2, and 3 in Figure II-1) are viewed as necessary by-products of the comprehensive methodology described. These products do not represent curriculum-development needs and, therefore, are not treated in this report.

The intended outcome of this research activity is the identification of national needs for curriculum development in vocational education within new and changing occupational areas. (This outcome is illustrated by the shaded area number 4 in Figure II-1.) For the purposes of this project, a curriculum development need, therefore, is defined as a new or changing occupational area that:

1. exhibits high employment growth on a national level;

2. requires skilled or technical training of at least six months of vocational education instruction but less than a four-year college program; and

3. possesses few, if any, vocational education curricula for preparing students to enter the occupational area or occupation.

The remainder of this chapter describes the specific procedures used to identify these needs in curriculum development.

---

[8] For a full definition of vocational education, see footnote 6, page 9.

Research Procedures

The procedures used to determine the findings consisted of: (1) identifying and selecting new and changing occupational areas within the scope of vocational education; (2) conducting an intensive analysis of a high priority new and changing occupational area; (3) acquiring, organizing, and describing information on new and changing occupational areas; and (4) matching available curriculum materials with new and changing occupational areas.

First Procedure: Identifying and Selecting New and Changing Occupational Areas Within the Scope of Vocational Education

The search for candidate occupations was conducted, according to a contract provision, only among extant sources of information. During the initial project year (1978), maximum attention was directed to an analysis of existing secondary sources.

Three basic investigatory approaches were employed to identify new and changing occupational areas at the national level that fell within the scope of vocational education: (1) identification and examination of existing national occupational data bases and employment forecasts; (2) location and review of occupationally relevant information sources; and (3) direction of a two-stage working conference to analyze employment opportunities and curriculum-development needs for identified new and changing occupational areas.

The first approach involved the identification and examination of existing national forecasts on employment and data based on occupations. The initial objective was to designate occupational areas and specific job titles that warranted further investigation. Collecting relevant data proved to be difficult for several reasons. First, substantive data on new and changing occupational areas simply did not exist. Second, the occupations were not uniformly defined across employers. Third, the employment data on new and changing occupations were included within existing occupations. And fourth, the collection of data directly from employers was hindered by proprietary concerns and by employers' lack of adequate knowledge about future demand.

Nevertheless, the Division of Occupational Outlook and the Division of Technology and Productivity, both of the Bureau of Labor Statistics (BLS) in the U. S. Department of Labor (DOL), were useful sources for securing estimates of future employment in given occupations. Three notable sources of data on employment and job openings were reviewed:

1. The Occupation-by-Industry Matrix (Bureau of Labor Statistics 1978) which provides information on recent (1976) and projected (to 1985) nationwide employment for 337 occupational categories in 184 industry groups;

2. Tomorrow's Manpower Needs (Bureau of Labor Statistics 1974) which treats separation rates by occupation for 1970 and 1985; and

3. The Occupational Employment Statistics (OES) program of BLS which surveys by industry the types of occupations and the number of workers in each occupation.

While useful, all of the governmental sources of occupational information suffered from one major failing: they dealt solely with currently recognized job or occupational titles. Only the OES program, which presently surveys 42 states and the District of Columbia (see Appendices A-2 and A-5 for a discussion of its use in Florida and Oklahoma) offers the possibility of locating new and changing occupational areas on a national level. A supplementary part of the OES employer survey lists occupations or jobs that are added because they do not fit established categories (that is, those "not elsewhere classified"). However, because the OES program does not differentiate between occupations that are truly "new and changing or emerging" and those that are added because they were reclassified, it is not presently possible to retrieve the kinds of information needed for identifying new and changing occupations from this employee-based data system. There is the possibility that the newly established National Occupational Information Coordinating Committee (NOICC), in concert with the State Occupational Information Coordinating Committees (SOICCs), can devise means for developing the necessary data.

The paucity of extant data did present definite difficulties in attempting to locate and to track new and changing occupational areas. Even in those few instances where employment projections were available, major problems were encountered. One problem was the contradiction in employment projections. In the energy area, particularly, the energy data seemed to be heavily influenced by the particular point of view of the group making the projection.

A second type of problem concerned extrapolating from existing data sources. For example, the 1974 BLS projections indicated a 70 percent gain between 1974-1985 for the occupational area labeled "Health Technologists and Technicians" (Carey 1976). This statistic suggested that there was a

strong demand for technicians in allied health occupations; the employment outlook was projected to grow from 361,000 in 1974 to 614,000 in 1985. However, a more recent projection, based upon the 1976 Occupation-by-Industry Matrix (Bureau of Labor Statistics 1978) showed that the total number of individuals to be employed in 1985 in this category has been revised downward to only 545,000 (a reduction of some 70,000 from the earlier projection). Thus, while this category had experienced strong growth between 1970 and 1976 (that is, a real growth of some 148,000 individuals employed, from 246,000 in 1970 to 394,000 in 1976, or 60 percent), nevertheless, over the next nine years, employment in this area was projected to grow only 38 percent, or to employ an additional 151,000 individuals in 1985.

Since data were not available on the demand for occupations in the area of allied health at the technician level,[9] it seemed reasonable at first, based on the 1974 data, to assume that occupations in this category were generally expanding. However, the 1976 data revealed clearly that the majority of the projected growth had occurred in the first six years of the fifteen year projection. Therefore, caution had to be exercised, and additional evidence provided, before any single occupation in this category could be selected as new and changing. This one instance highlights the difficulties of attempting to draw interpretations about small new and changing occupations that are included in existing occupational areas.

---

[9] BLS also reports data for a residual category, "Other Health Technologists and Technicians." However, this residual total in the Carey article was greatly inflated by the fact that statistics for two occupational titles, Health Records Technologists and Technicians, and Therapy Assistants, were not broken out, but were reported under the residual category total. While this certainly contributed to an artificial inflation of the total for the category "Other Health Technologists and Technicians," the size of the decline reported in the 1978 projections is so dramatic that it does signal a major adjustment in the future projections for the changing or new health careers. The projected percent growth between the two reports (1974, reported by Carey, and 1976 BLS Occupation-by-Industry Matrix) fell from 110 percent to 38 percent, and the projected total number employed in 1985 declined from 208,000 to 92,284.

Based on the limitations of extant data, two important decisions were made regarding a strategy for the selection of new and changing occupational areas and the preparation of information reported in this study. First, the lack of information on the category of occupations classified as new and changing reinforced the importance of using occupational areas as the conceptual basis for this report. Thus, a primary emphasis was placed on identifying broad trends for occupational areas that were or will be experiencing high employment opportunities, rather than on individual occupations.[10] And second, employment growth was selected as the critical variable for assessing the viability of future employment opportunities for occupational areas that are new or changing. Lecht emphasized this point in his recent study on changes in occupational characteristics:

> Slightly more than 900,000 of the job openings anticipated annually between 1970 and 1985 are estimated to arise from employment growth, and the remainder, about 1.8 million, from the replacement of attrition losses. The occupations in which replacement demand dominates job openings tend to have a high representation of women who leave the labor force, at least temporarily, to rear children, and who usually retire at a younger age than men. High replacement demand is also characteristic of slow growth occupations. Employment growth is typically the dominant element in new occupations, in occupations concentrated in rapidly growing industries, often public service industries, and in fields heavily influenced by technological advance (Emphasis added) (Lecht 1976, p. 5).

A second approach for identifying new and changing occupational areas called for locating and reviewing additional sources of relevant information, such as the literature on new and changing occupations (including Drewes, et al. 1978; Lecht 1976; Meleen, et al. 1976) publications on recent trends in technology (including Doggette 1978, and Kahn 1976), legislative enactments (U. S. Congress 1968 and 1976), and contacts with individuals and organizations considered knowledgeable about occupational change. Each of these sources provided valuable information on those new and changing occupational areas that warranted further investigation.

---

[10] See footnote 5, page 7, for definitions of these terms.

Two recent studies of new and emerging occupations were carefully reviewed and considered especially informative. A national study, conducted by Contract Research Corporation for the U. S. Office of Education (Meleen, et al. 1976), investigated some 100 occupations and nominated eleven as new and emerging. Conserva, Inc. (Drewes, et al. 1978) recently concluded a state study for the Illinois Department of Education that identified fifty-four occupations and selected seven as new and emerging. In addition, project staff developed procedures for periodic monitoring of those information sources reporting the technological innovations with potential impact on occupations; newsletters, trade journals, and publications of professional associations, private organizations, and state and federal agencies; conferences on new technologies, such as the jointly sponsored AACJC-ERDA[11] 1976 energy conference and the planned 1979 Department of Energy meeting to explore employment and training needs for alternative energy areas; major national agencies, both governmental and non-governmental, that collect and prepare information on occupations such as the Bureau of Labor Statistics (BLS) and the Bureau of Health Manpower (BHM); and with state industry-education-labor coordinators, representatives of state boards of community colleges, professional associations, labor groups, and knowledgeable researchers.

In order to develop vocational training programs that are beneficial to students and the community, it was necessary that basic information be assembled on each new and changing occupational area. Whenever possible, the occupational areas under investigation were probed for answers to such questions as the following (from Doggette 1978):

1. Will these occupations require completely new skills, an alteration of existing skills, or new combinations of existing skills?

2. Will the new or changing technical positions require totally new curricula or just the introduction of new courses within existing curricula? Or will the emerging employment areas require simply a revised combination of existing courses?

3. How many of the new and changing technical jobs have, or are likely to have, constraints to entry into the field(that is, control over entry by union or professional association or control of certification by government or trade association)?

---

[11] American Association of Community and Junior Colleges (AACJC) and the former Energy Resources Development Agency (ERDA), which is now part of the new Department of Energy (DOE).

4. What are the probable sources of training for the new or changing jobs? In particular, how much of the training will be gained by informal on-the-job training and by formal in-company, union, or trade association programs?

5. Will the demand for the technical occupations occur at the national level, at the regional level, and/or at the local level?

6. Will the demand continue over time or is it likely to be a one-time employment need?

While much valuable material was gleaned from the diverse research sources, the information base that the first two approaches were able to uncover on promising occupational areas was limited and uneven. This fact pointed up the need for a third, more innovative strategy of data collection.

The third investigatory approach consisted of a two-stage working conference to identify promising occupational areas that are new and changing and to assess their prospects for employment growth. This research mechanism provided a more up-to-date understanding of basic issues, such as the demand for and the character of the occupational areas under consideration, and it provided new details on topics for which information was lacking.

The format of a two-stage working conference was adopted so that a small planning panel, composed of extant and knowledgeable government officials for the major occupational areas under investigation, would conduct an initial, indepth exploration of their field. Their recommendations would then form the basis for convening a larger task force of nationally recognized authorities who would examine in more minute detail both the opportunities for employment and needs for curriculum development in their occupational areas.

A four-member planning panel (see Appendix B-2) was assembled to evaluate information on the field of allied health education. This area was determined to be the most promising new and changing occupational area based on project staff's analysis of available extant data sources notable, the BLS Occupation-by-Industry Matrix. The panel recommended that long term health care settings be studied more intensively. About one month later, a seventeen member task force was brought together at the National Center to review employment opportunities and curriculum needs for long term health care (see Appendix B-3). The rationale for convening this working conference, the procedures used to conduct the session, and the findings of the task force are described in the following pages.

Second Procedure: Conducting an Analysis of a High Priority New and Changing Occupational Area

The decision to adopt this third investigatory approach was based upon the belief that convening a task force of thoughtful and informed individuals would provide the project with its most significant fund of resources and with a significant opportunity for leadership. As Cunningham has written on convenings:

> A decision to convene is an initiative. It assumes that the convener can, through invitation, achieve an assembly . . . But most of its power resides in the opportunity to define purposes, clarify objectives, design formats, and extend invitations to those to be convened in regard to an issue, a problem, a policy, or a public need.
>
> Convening is not, in our judgment, an act of casual consequence, nor is it capricious. It is a serious and hopefully respected instrument of leadership. Its employment should be strategic and targeted. And its utilization should proceed with the incorporation of a solid knowledge base relative to the substantive problems and issues under examination as well as the processes and procedures for their review (1974, pp. 1, 9-10).

Thus, it was intended that this two-stage conference would be a knowledge-generating activity, dependent in part upon the serendipity that would grow out of the group's interactions, but ultimately objective-centered and product-oriented.[12] The task force to be convened would remain in existence only for the two days of the conference.

The four members of the panel on health planning (see Appendix B-2) strongly recommended that the occupational area of long term health care be selected for intensive analysis by the task force to be convened. Long term health care generally refers to health and social services provided to chronically disabled, usually elderly, persons. (Congressional Budget

---

[12] It is worth distinguishing between convenings and meetings. Meetings are usually more casual, less objective-centered, and more faithful to bureaucratic expectations related to institutional maintenance and normalcy (Cunningham, 1974, p. 6).

Office 1977).[13] Long term health care services range from frequently required, highly skilled nursing and therapy that must be provided in a nursing home to occasional visits by a homemaker/home health aide or social worker. Table II-1 lists fifteen possible settings for long term health care, as well as nine potential target populations. (Appendix C also provides definitions for the major types of long term health care services.)

The seventeen members of the task force (see Appendix B-3) who met at the National Center in Columbus, Ohio represented various points of view: those of federal and state agencies on health, labor, aging, and education (secondary and post-secondary); those of professional associations such as American Medical Association, American Vocational Association, and American Association of Allied Health Professions; and those of provider groups and health-care practitioners, including representatives from nursing and nursing homes, home health agencies, homemaker/home health-aide services, rural health, and aging care. Participants, however, took part in the task force as well-informed individuals rather than as spokespersons for their organizations, and the findings reported in this study reflect the consensus of the group assembled and are not necessarily in accord with the positions of any organization or agency.

---

[13] Legislators and administrators at all levels of government have expressed their concerns about long term health care services required by the elderly and by persons of all ages afflicted with chronic disabilities. Recent studies have echoed their concerns. For example, the Arden House Conference Report on Continuity of Long Term Care has characterized the current situation as one in which "present needs are far from being met, present services are scattered among a number of public and private providers, and no coherent policy exists to deal with the many problems involved, either human or fiscal " (State Communities Aide Association, 1977, page 1.).

The task force was convened at a time of serious debate about the expanding demand for long term care, the appropriateness of such care, the quality of care in nursing homes, and the institutionalization of the disabled and the elderly. The escalating cost of health care has contributed to the sense of urgency, and numerous legislative, cost-containment initiatives have proposed changes in regulatory and rate-setting provisions and in plans for reclassification of beds.

Table II-1

Settings and Target Populations
for Long Term Health Care

Long Term Health Care Settings

1. In-Home Care
2. Skilled Nursing Facilities
3. Hospitals - Long Term Health Care Units
4. Intermediate Care Facilities
5. Residential/Domicile
6. Mental Health Institution
7. Mental Retardation Institution
8. Intermediate Care Facilities - Mentally Retarded
9. Day Care (Adult)
10. Drug and Alcohol Facilities in Long Term Health Care
11. Hospice (in-patient)
12. Hospice (home-care)
13. Congregate Housing (corporate deliver)
14. Halfway House (transitional housing)
15. Respite Care

Target Populations

1. Mentally Retarded
2. Terminally Ill
3. Developmentally Disabled
4. Elderly
5. Chronically Ill
6. Physically Disabled
7. Children from Disrupted Homes
8. Mentally Ill
9. Convalescent-Temporarily Ill

The primary objective of the task force was to identify needs for curriculum development at the technician level for new and changing occupational areas in long term health care settings. A secondary objective, although a prerequisite to the primary one, was the group's reaching a consensus on factors influencing the demand for long term health care. Based on exploratory discussions, it was decided that two areas ought to be investigated intensively: institutional care[14] and in-home care.

To establish a context for discussing the opportunities for employment and the needs for curriculum development in both settings, the group then generated a catalog of some fifty forces, factors, and trends that influence the future of long term health care services (see Appendix D). These items then were classified under six major categories listed in order of priority:

1. Societal/Cultural Conditions
2. Financing
3. Education and Training
4. Regulating/Controlling
5. Planning
6. Coordinating Services

Based on this preliminary discussion, the task force spent the remaining day and a half in work groups focusing on employment opportunities and curriculum-development needs for institutional and in-home care settings. The agenda for the task force meeting is provided in Appendix B-4.

In its two days of convening, the task force accomplished the following four major tasks:

1. identified health-care needs and corresponding competency requirements for the two selected health-care settings;
2. described the status of training in vocational education presently available to meet competency requirements;

---

[14]This term will be treated as synonymous with skilled nursing and intermediate care facilities. See Appendix C for definitions of terms.

3. identified obstacles to the development of adequate training; and

4. reviewed, organized, and evaluated the findings developed during the convening.

Project staff wish to acknowledge the valuable assistance of the members of the task force in generating the findings on long term health care that are incorporated in Chapter III of this study.

The three basic investigatory approaches previously described generated a continuous flow of information on new and changing occupational areas, so a procedure to monitor the information was initiated. Files were established for each promising occupational area, and a tracking strategy was devised to determine whether these areas met the three criteria for qualifying as "new and changing." Each area was matched with the available national data on occupations and employment. For example, BLS's 1974 and 1976 Occupation-by-Industry matrices were used to determine employment prospects. Similarly, materials received from contacts in federal and state agencies, educational institutions, and associations for business, industry, and labor, as well as information gleaned from a review of relevant publications, were filed and coded for each identified occupational area.

The process of identification and tracking of new and changing occupational areas was an iterative one, with new candidates being considered at all stages of the project. In the interim report, prepared in July 1978 (during the sixth month of the project), some twenty-four occupations were identified as promising candidates. By September a list of thirty candidates, including twelve of the original twenty-four, was prepared as part of the project's search for existing curricula. Finally, the task force identified within the occupational area of long term health care two additional promising new occupations (long term care technician and recreation therapy leader) and three occupations with deficiencies in general training (nursing home administrator, homemaker-home health aide, and supportive services assistant).

Ultimately, the decision on whether to continue pursuing information on an identified occupational area or to eliminate it from further consideration was based on the preponderance of evidence available at critical project milestones. Information on occupational areas was often limited. Several promising areas (such as microprocessing, cardiopulminary profusion and community mental health) were dropped because of a lack of sufficient information, especially data on trends in employment growth. Similarily, some occupations were eliminated because they did not meet other established criteria, such as nuclear

engineering technician due to a reported low placement rate. And finally, several candidate occupational areas (such as emergency medical technician) were dropped because adequate curricula already existed.

The next two sections of this chapter will explain how needed information on candidate new and changing occupational areas were identified, and how this information was matched against available curriculum materials to determine if a curriculum development need existed.

Third Procedure: Acquiring, Organizing, and Describing Information on New and Changing Occupational Areas

Table II-2 below illustrates the profile of information that was sought for each new and changing occupational area. These categories were selected after reviewing other studies, notably "Guidelines for Development of New Health Occupations," (CAHEA, 1978, pp. 72-73 and Drewes, et al., 1978, p. III-2).

The use of only secondary data collection procedures to assemble occupationally relevant information, such as that described in Table II-2, produced information that often was limited in the scope of the occupational areas covered and lacking information on important categories, such as job duties, educational requirements, and wage and hour specifications. These results reinforced the importance of conducting some type of intensive analyses of promising occupational areas during the

Table II-2

Categories of Occupational Information Needed for New and Changing Occupational Areas

A. Job Duties and Employment Settings

B. Educational or Training Requirements

C. Typical Employers
   (1) Present Source(s) of Workers
   (2) Sex Barriers and Other Constraints
   (3) Wages and Hours

D. Employment Outlook: Summary of Employment Demand in Short Term and Long Term
   (1) Expansion
   (2) Replacement
   (3) Future Projections

E. Agencies and Individuals to Contact

second half of the project year, and they pointed up the need to initiate primary or new data collection in subsequent projects. This position is supported by Nickerson in his discussion of the experience of the other national study (Meleen, et.al. 1976):

> There is no substitute for personal on-going contact with actual employers, local chambers of commerce and unions in this area (Nickerson, 1978, p. 6).

Moreover, the project's consultant review panel (see Appendix B-1) strongly suggested a "peer-to-peer" telephone exchange with authorities on each new and changing occupational area, and it emphasized "a need to gain confirmation, especially in instances where there are conflicting reports, and verification by numerous sources in assessing new and changing or emerging occupations."

Fourth Procedure: Matching Available Curriculum Materials With New and Changing Occupational Areas

A fourth major task that required the project staff to develop prototype methods was the search of existing curriculum sources to determine whether there was, in fact, a need for a national investment in curriculum development for the identified new and changing occupational areas. (This step is illustrated by Circle C in Figure II-1.) No attempt was made to secure actual curriculum materials, but descriptive information about the curricula was sought.

In recent years, the need to make better use of instructional materials developed by curriculum designers in vocational education and in other disciplines has been recognized by policy makers and educators at every level (see Blue 1978; Dreves and Katz 1975; Nelson 1978; U. S. Congress 1976; and U. S. Office of Education 1977). However, accomplishing this task has been complicated by several factors. First, curriculum development in vocational education is a decentralized activity initiated by private and public organizations, for various levels of instruction (secondary, post-secondary, community, and technical, and adult), and for various clienteles (regular, special, disadvantaged, and bilingual). Second, no comprehensive clearinghouse on vocational curricula provides centralized access to training programs or to descriptions of all available curricula in such terms as those in Table II-2. And third, there is no common nomenclature to ensure recognition of materials appropriate for a job title, occupation, or program.

Therefore, the search for curricula that would satisfy the instructional needs of the candidate occupational areas re-

quired a very labor-intensive, flexible, and multifaceted approach. Project staff investigated the National Center's AIM/ARM collection, the ERIC Clearinghouse on Adult, Career and Vocational Education, the Dialogue System, files on vocational education curricula developed by federal funding since 1970 (see Appendix E) and available sources of Department of Defense curricula (Forgione and Orth 1979). In addition, requests were made of state directors of community and junior colleges (for example, Ohio Board of Regents) to provide lists of new post-secondary programs authorized over the past three years. (These results are provided in Appendix F.) And finally, in late September, the National Network for Curriculum Coordination in Vocational and Technical Education (NNCCVTE) was asked to identify available curricula from their own files or those of their cooperating states, for any of thirty promising new and changing occupational areas. Five of the six centers responded, as did seventeen state liaison representatives, identifying curricula in fourteen of the thirty categories (see Appendix G).

Identification of curricula pertinent to new areas was difficult because of a shortage of information about such important matters as the tasks and the knowledge to be learned. Promising new and changing occupational areas for which there were few, if any, curriculum materials available were identified as curriculum development needs. These findings are reported in Part Two of this study.

References

Blue, James L. National Network for Curriculum Coordination in Vocational and Technical Education (NNCCVTE) Concurrent Meeting Keynote Address, July 11, 1978.

Bureau of Labor Statistics, U. S. Department of Labor. Occupation-by-Industry Matrix. (unpublished 1978).

Bureau of Labor Statistics, U. S. Department of Labor. Occupational Outlook Handbook, 1978-79 Edition. Bulletin 1955. Washington, D. C.: U. S. Government Printing Office, 1978.

Bureau of Labor Statistics, U. S. Department of Labor. Tommorrow's Manpower Needs. Supplement No. 4, 1974. Washington, D. C.: U. S. Government Printing Office, 1974.

CAHEA (Committee on Allied Health Education and Accreditation). Allied Health Education Directory/7th Edition. Monroe, Wisconsin: American Medical Association, 1978.

Carey, Max L. "Revised Occupational Projections to 1985." Monthly Labor Review, November 1976, pp. 13-14.

Congressional Budget Office. Long Term Care for the Elderly and Disabled. Washington, D. C.: U. S. Government Printing Office, 1977.

Cunningham, Luvern. "The Power and Meaning of Convening." Draft Paper prepared for the Institutional Leadership Program. Columbus, Ohio, December 27, 1974.

Doggette, John R. and Blair, L. M. "Emerging Technician Occupations in the Energy Field". To be published 1978.

Drewes, D. W. and Katz, Douglas S. Manpower Data and Vocational Education: A National Study of Availability and Use. Raleigh, North Carolina: Center for Occupational Education, North Carolina State University at Raleigh, 1975.

Drewes, D. W.; Spetz, Sally H.; Heath, Walter D.; and Katz, Douglas S. Current and Future Employment Opportunities in New and Emerging Occupations within Illinois. Raleigh, North Carolina: CONSERVA, Incorporated, August 31, 1978.

Forgione, Pascal D., Jr.; and Orth, Mollie N. Department of Defense Curricula: Information Concerning Conversion for Civilian Use. Columbus, Ohio: National Center for Research in Vocational Education, January, 1979.

Kahn, Herman; Brown, William; and Mortel, Leon. The Next 200 Years: A Scenario for America and the World. New York: William Morrow and Company, Inc., 1976.

Lecht, Leonard A.; with Matland, Marc and Rosen, Richard. Changes in Occupational Characteristics: Planning Ahead for the 1980's. New York: The Conference Board, Inc., 1976.

Meleen, P. S.; Gordon, A. K.; Livesday, S.; Donovan, J.; Shuchat, J.; and Bloom, S. Planning for Vocational Education: New and Emerging Occupations. Belmont, Massachusetts: Contract Research Corporation, 1976.

Nelson, Orville. "Emerging Occupations." The Wisconsin Vocational Educator. 1978, 4, 1-3.

Nickerson, Bruce E. "Vocational Education for a Changing Marketplace." The Wisconsin Vocational Educator. 1978, 4, 5-7.

State Communities Aide Association (formerly State Charities Aide Association). "CETA Public Service Employment in the Home Care Field: A Study of the Implications in Services, Costs and Job Placement." Submitted to Office of Research and Development and Training Administration, Department of Labor, May 1978.

State Communities Aide Association. Report of Arden House Institute on Continunity of Long-Term Care. December 18-20, 1977.

U. S. Congress. Education Amendments of 1976. Public Law 94-482, Enacted October 12, 1976. Washington, D.C.: U. S. Government Printing Office, 1976.

U. S. Congress. Vocational Education Amendments of 1968. Public Law 90-576, Enacted October 16, 1968. Washington, D. C.: U. S. Government Printing Office, 1968.

PART TWO

FINDINGS OF THE STUDY

Introduction

The findings reported in Part Two (Chapters III and IV) reflect the state of knowledge at the close of the project's initial year of exploration. Four promising occupational areas, namely, long term health care, other allied health, occupational safety and health, and alternative energy, were selected to form the framework for a discussion of vocational education curriculum development needs for new and changing occupations. These four occupational areas were chosen and others excluded because the project was able to generate the necessary knowledge base that met one or more of the following criteria:

1. existence of sufficient information on employment growth trends on a national level;

2. presence of substantial prior activity and knowledge, such as federal studies, congressional testimony, organizational or agency analyses and major conferences; and

3. availability of nationally recognized authorities and agency representatives who could be assembled to provide testimony and evidence.

To facilitate the selection of national curriculum development priorities for new and changing occupational areas, information in this report has been organized in the form of scenarios. For each selected occupational area, that is, long term health care, other allied health, occupational safety and health, and alternative energy, scenarios have been developed that present a critical analysis of available demographic, social, economic and political factors that are expected to influence the identified occupational areas. Given the general inadequacy or the relatively high level of uncertainty in employment forecasts for occupational areas that are new and changing, the scenario reporting technique allowed for a description of the broad context within which the occupational areas were developing. In addition, the explication of individual scenarios for the selected occupational areas served to promote increased understanding of the interplay of forces influencing occupational employment. These included varying and impending federal regulations, incentives and programs, technological advancements, and fluctuating preferences of the population concerning social, economic and environmental priorities.

The findings presented in Part Two reflect also the two levels of information that were available to the project staff for preparing this report. More complete information is presented for long term health care (Chapter III) because the special task force provided supplemental materials relating to long term health care employment opportunties and curriculum

development needs. The group also generated additional occupationally relevant data that allowed for a more comprehensive treatment of two settings, institutional long term health care and in-home long term health care.

For the remaining occupational areas, that is, other allied health, occupational safety and health, and alternative energy, the findings reported in Chapter IV are representative of the types and quality of information that were assembled relying only on a secondary analysis of existing occupational information and curriculum sources.

Curriculum development needs in vocational education are identified for four occupational areas, including ten occupations that qualify as new and changing:

- Long Term Health Care:
  - o Long Term Care Technician
  - o Therapeutic Recreation Leader
  - o Nursing Home Administrator
  - o Homemaker Home Health Aide
  - o Supplementary Services Assisting
- Other Allied Health Areas:
  - o Multi-Competency Technician
  - o Diagnostic Medical Sonographer
- Occupational Safety and Health:
  - o Industrial Hygiene Technician
- Alternative Energy:
  - o Solar Mechanic [15]
  - o Solar Technician [15]

Information on position description, employment outlook and exisiting education and training programs is provided, wherever it is available.

---

[15] These two occupations, Solar Mechanic and Solar Technician, have been included even though there is considerable debate surrounding projected employment demand and curriculum development needs for technician level personnel in all types of solar energy. A major unresolved issue concerns whether existing personnel in the building trades should and can be retrained to perform needed tasks or whether the demand for solar workers and the requisite skill levels require a separate occupational specialty.

CHAPTER III: LONG TERM HEALTH CARE

A major emphasis in the first year of the project focused on an analysis of employment opportunities and curriculum development needs for technicians in allied health occupational areas. Based upon the strong recommendation of a four member health planning panel (see Appendix B-2), the area of long term health settings was selected for special intensive analysis. A seventeen member task force was assembled during the fall of 1978 to assist the project staff in evaluating employment demand and curriculum needs for long term health care settings. See Appendix B-3 for a list of the participants and their affiliation.

The purpose of this chapter is to delineate the results of the previously described task force meeting on long term health care. Employment demands and curriculum development needs for two types of long term health care settings are discussed: institutional care and in-home care. The factors affecting the nature and growth of these two settings and the opportunities for curriculum development within these areas are presented. In addition, a description of five long term health care occupations that were identified as new and changing is provided. These descriptions include: (1) a position description; (2) an employment outlook; (3) a discussion of existing educational and training programs; and (4) possible implementation strategies.

Institutional Long Term Health Care

Projecting future employment opportunities and curriculum development needs for institutional health care requires a two-pronged assessment. First, the occupations found in long-term health care must be identified and their adequacy in terms of numbers and competencies to meet the care needs of residents in long term care analyzed. Second, reasonable projections for the size and nature of long term health care facilities and services at some point in the future must be made. Both tasks required data not readily available. Lacking sufficient data for projections, the assessment of future employment opportunities and curriculum development needs for institutional long term health care institutions provided in this section reflects the best judgments available.

Conditions Affecting the Nature and Growth of Institutional Long Term Health Care

Attention has become focused on long term health care as public planners and policy makers have identified new societal trends which indicate changes in human needs. Thanks to medical advances and an increasingly higher standard of living, Americans are living longer. However, many older citizens have chronic health care needs which need to be addressed. Each day, approximately 5000 Americans join the ranks of those over 65. Currently this older population (65 and over) totals about 23.5 million people, or, 10.9% of the total population. This percentage of older persons is expected to grow to 17.6% by 2050. The growth of older persons both in absolute numbers and in relation to the total population requires planning to ensure adequate services (Brotmann 1978). An analysis of the human resource needs is an important part of the planning for adquate health care.

Approximately one in twenty people over age 65 live in long term care institutions. In the 85 and over age group, the ratio is one in five. The reasons why these people live in long term care facilities vary, but the basic reason is that they are physically unable to reside in more independent living arrangements. These people have muliple medical conditions combined with the normal aging conditions which decrease their ability to function independently.

The following six assumptions need to be weighed in assessing employment demands and curriculum development needs for institutional long term health care.

First, there will always be a segment of the elderly and chronically ill population which will require institutional long term health care. Institutional long term care can be defined as 24-hour nursing care that usually exceeds 90 days in length and is provided in facilities called skilled nursing or intermediate care facilities. A variety of health services is provided through long term health care programs.

"Health" is defined to include all of the individual's physical, psychological, social and spiritual or religious needs. Thus, long term care services are coordinated for the whole person. In addition to skilled nursing and intermediate care, the third component of the long term care continuum is residential or domiciliary care. This type of long term health care provides supportive living in a sheltered environment, usually without on-site health and medical services. The human resource requirements for residential care programs are not addressed

in this assessment of the human resouce needs for institutional long term health care.

Nursing homes must meet certain requirements to be "licensed" by the state (a requirement for all nursing homes), or to be "certified" to participate in the Medicare and/or Medicaid programs. "Certification" is necessary for the facility to receive reimbursement for care given to patients who are eligible for services under these two programs. Approximately 57% of all nursing home revenues come from public programs such as Medicaid. This funding covers the care for about 66% of all nursing home residents.

Both licensure and certification requirements have specifications for facility staffing. Federal requirements for Medicare and Medicaid specify that a facility not admit or retain patients for whom they cannot provide needed services with competent staff or consultant services. These programs also specify eligibility requirements for individuals and the services which must be required to justify nursing home placement. Other related programs for quality care assessments such as medical evaluation studies and PSROs (Professional Standards Review Organizations) also impact on staffing.

Second, public health programs--whether called Medicare, Medicaid, or National Health Insurance--have significant impact on nursing home manpower needs. (See Appendix H for background information on these programs.) Nursing home care initially followed the medical model. It still does, with the addition of multidisciplinary health components. "Health," as the multifaceted concept including physical, psychological, social and spiritual components, requires additional staffing needs beyond ordinary nursing care. Extended residence in a long term care facility necessitates providing holistic care.

Third, the inclusion of the total needs of nursing home residents within the definition of long term health care requires that many professionals other than nurses need to be involved in the delivery of health care services. Moreover, the philosophy or goal that nursing home care become rehabilitative rather than simply custodial in nature affects the staffing needs of institutional care facilities.

Fourth, a philosophy of rehabilitation for nursing homes requires more staffing for therapy, patient education and discharge planning. Available reimbursement for nursing home care also affects staffing. Nursing homes receive $25 per diem reimbursement. Federal regulations require reimbursement on a cost-related basis. Often, however, available tax money is the basis for establishing reimbursement rates, as is the desire for cost containment.

Fifth, reimbursement from third-party agents determines available resources to hire personnel. Appendix H describes the mechanisms used by the major medical plans to compensate participating institutions, and Appendix I discusses recent federal government regulation relating to long term health care services.

There are numerous occupations found in institutional settings which for our discussions will be treated as synonymous with skilled nursing and intermediate care facilities. The adequacy of the numbers required to meet residents' needs and to support the staff's efficiency is debatable. There are no reliable standards for staffing because of the range of patient needs in nursing homes. Residents have multiple problems, each in a different configuration. Various studies have shown that the categories of care (skilled nursing and intermediate care) are arbitrary and do not accurately define staffing to meet patient needs.

The competencies of existing nursing home staffs have not been assessed or even studied. Only nursing home administrators have a license unique to long term care. Other professionals, such as registered nurses, licensed practical nurses (LPNs), social workers, occupational therapists, and physical therapists, are licensed as competent in their respective disciplines--but they are not necessarily competent or knowledgeable about long term care.

In 1974 there were approximately 15,300 nursing homes in the U.S., staffed by some 765,000 employees. Table III-1 lists the variety of occupations found in institutional long term health care settings. The largest number of employees are in the nursing departments. Nationwide, there were 76,000 registered nurses,

Table III-1

Occupations Employed in Institutional Long Term Health Care

Audiologist	Medical Records Librarian
Bookkeeper/Accountant	Nursing Home Administrator
Clerk/Cashier, Clerk-Typist	Occupational Therapist
Cook	Physical Therapist
Dietitian	Recreational Therapist/Activities Coordinator
Food Service Supervisor/Dietetic Assistant/Technician	Registered Nurse
Food Service Workers	Social Work Designee/Technician
Housekeeper	Social Work Supervisor
In-Service Education Director	Speech Therapist/Pathologist
Licensed Practical Nurse	Volunteer Services Director
Maid, Groundskeeper, Custodian	

Source: AHCA 1978.

72,500 licensed practical nurses, and 374,000 nursing assistants (Bureau of Labor Statistics 1976).

The employment and training demands for nursing homes are projected to remain at a steady rate. Projections for future growth of nursing homes are speculative, since there are many factors which may affect their growth. The existing nursing home bed supply was 1.6 million for all forms of long term care in 1975. The Congressional Budget Office (1977) projects a potential demand for 2.1 million beds in 1980 and 3.0 million beds in 1985. This figure is based on current statistics of functional disabilities among the aged. These projections amount to a 31% increase between 1975 and 1980, and an 87% increase between 1975 and 1985.

Optimal staffing ratios have not been established for nursing home facilities. The Congressional Budget Office report, however, projected that total employment in nursing homes is expected to exceed 1,300,000 in 1985. The nursing staff accounts for 62% of nursing home employees. In 1975 the average 100 bed facility employed approximately nineteen registered nurses, licensed practical nurses, and nursing assistants for the day shift; twelve for the evening shift; and eight for the night shift. Maintaining the same staffing levels, there will be a need in 1980 for an additional 312,000 nursing personnel. The distribution of nursing personnel, using 1975 staffing ratios, will be for 230,000 new nursing assistants, 43,680 licensed practical nurses and 37,440 registered nurses.

And sixth, several special problems have affected the ability of long term health care facilities to recruit needed personnel. Three of the key issues are:

1. The attractiveness of long term care as a work setting, due to negative social beliefs about long term care, perceived lesser status of working in long term care as compared to acute or ambulatory care, and the lack of positive early exposure to long term care in health professional training curricula;

2. The ability of long term care programs to provide competitive salaries for health professionals; and

3. Geographic distribution of health professions which indicates a distinct lack of preference for rural and inner-city employment.

The problems are reflected in the inability of long term care to attract sufficient numbers of personnel and, more importantly, sufficient numbers who are trained in gerontology, geriatrics and chronic illness.

Opportunities for Curriculum Development in Instructional Long Term Health Care Occupations

The identification and selection of curriculum development needs for new and changing occupations relating to instructional long term health care took into account available demographic information and the status of existing training programs in health occupations that the project staff had been able to assemble for consideration. Information and data provided by the special task force on long term health care participants were also studied. Two new and changing occupations, those of Long Term Care Technicians and Therapeutic Recreation Leader, and curriculum modules[16] for a third institutional long term health care occupation, that of Nursing Home Administrator, were nominated as warranting curriculum development considerations by the U.S. Office of Education.

Long Term Care Technician. This nomination recognizes the general lack of exposure to gerontology for nurses and the difficulties of recruiting nurses to long term care, especially in rural and urban areas. There is reason to believe that a new occupation, that of Long Term Care Technician, can provide new options in patient care. The emphasis for this multicompetency generalist is on specialized training in the unique needs of long term care residents and in basic long term care techniques. The position would not replace existing positions for registered nurses (RNs), licensed practical nurses (LPNs) or nursing assistant, but would add to the staff a person with specialized skills in long term care. The competencies of the Long Term Care Technician would be especially useful in cases where qualified RNs trained in gerontology are not available.

1. Position Description:

The Long Term Care Technician may be defined as an allied health generalist possessing multiple competencies including LPN licensure and specialized training in basic long term care techniques, gerontology and chronic illness. The individual works under the supervision of a registered nurse. Additionally, the long term care technician would be trained in human relation skills in order to administer empathetic patient care and to function effectively as a supervisor/manager.

The job duties of the Long Term Care Technician would be the same as those currently defined for LPNs under the various state nurse practice acts. The primary benefit for the facility employing the Long Term Care Technician would be improved patient care. Currently, LPNs, under the supervision of an RN consultant, are functioning as charge nurses in rural and inner-city nursing homes.

---

[16] Module: A unit of learning which deals with a specific topic or concept and may be used in one or more courses (CAHEA 1977, p. 517).

The additional skills of the Long Term Care Technician would certainly make the job of charge nurse easier. An opportunity for specialization exists in administrative support for the patient care planning process. The Long Term Care Technician would bring special knowledge and skills to facilitate patient assessment, care planning, and evaluation.

The Long Term Care Technician could be employed in any long term care setting: long term care facilities, home health, or day care. Facilities, especially the smaller rural or inner-city ones, could utilize the services of the Long Term Care Technician.

2. Employment Outlook:

Additional data need to be compiled and assessed in exploring the feasibility of this new occupation. Specifically, the level of interest by long term care facilities and other long term care programs needs to be ascertained. The willingness of other health professionals to accept the new occupation must also be evaluated. On the current political scene, the American Nurses' Association is promoting a resolution to dissolve nursing occupations with educational requirements less than a baccalaureate degree. This move, if successful, would affect nursing assistants, licensed practical nurses and associate degree nurses. The extent to which this move becomes a reality will affect the prospects for the Long Term Care Technician.

3. Education and Training Programs:

The creation of a new occupation is not something to be done as an academic exercise. It should be based on a real need for competencies that are not currently available to provide the type of nursing care needed. If other nursing programs offered adequate training for long term care and if properly trained nursing personnel were available in all geographic locations, a new occupation would not be necessary.

Steps are being taken by the Association for Gerontology in Higher Education and other such groups to promote exposure to gerontological training in medical, nursing and other health programs, but this does not alleviate the problem of geographic distribution. This new occupation would be based on an Associate Degree in Applied Science (A.S.) for Long Term Care Technicians. The two-year program, taught by a multi-disciplinary faculty managed by a long term care coordinator, would consist of both didactic and clinical experiences. For a licensed practical nurse, it would require a minimum of one year in the comprehensive program. A nursing assistant with experience could try to qualify for LPN competencies for advanced standing in the LPN program. This could be followed by the one year of comprehensive training in long term care principles.

The second year's program, the comprehensive part, would include exposure to the basics of several disciplines essential to long term care. These would include, but not be limited to, physical therapy, occupational therapy, activities, nutrition, environmental sanitation, social work, medical records, and home health/institutional living. The emphasis would be on care techniques and principles that pertain to the goals of long term care. The Long Term Care Technician would have a good overview of these components, without the specialization required by their individual practitioners. The Long Term Care Technician would possess both licensure as an LPN and an Associate Degree in Applied Science for Long Term Care Technicians. This program would be especially appealing to LPNs currently working in long term care who desire an Associate Degree and career advancement. There are no foreseeable sex barriers to training or to practicing as a Long Term Care Technician. The Long Term Care Technician should earn a salary equivalent to one earned by a person who holds an Associate Degree in Nursing, and probably this person should earn more than an LPN without the additional training.

4. Implementation Strategies:

There are several steps recommended in exploring the feasibility of creating the new occupation of Long Term Care Technician. Three concurrent steps are recommended:

a. Survey existing two-year programs in "long term care";
b. Convene an Advisory Committee of Long Term Care Facilit. and Program Administrators and Directors of Nursing to (1) identify all issues, pro and con, to be considered; (2) develop a preliminary job description; (3) define the needs and (4) draft a survey instrument to obtain additional information from the long term care field; and
c. Communicate with all professional groups with knowledge bases from which the competencies of this new occupation will be drawn; promote their involvement and support in every possible way.

Based on the analysis of data and responses obtained from these three steps, a more accurate description of the Long Term Care Technician can be developed. Further, the potential for employment demand can be specified. If the findings are positive, the next steps will be to develop the curriculum for the Associate Degree in Applied Science for Long Term Care Technician and to plan and implement a demonstration project in several locations.

The key to the success of the training programs will be the acceptance of the new occupation by certifying agencies for

Medicare and Medicaid. The Health Care Financing Administration, the U.S. Department of Health, Education and Welfare, should be involved early in the developmental process and plans should be made to inform and educate the Medicare and Medicaid Surveyors. Educational activities will also be needed to educate long term care facility administrators and other professionals working in long term care on how best to work with this new occupation. In exploring the feasibility of this new occupation, several issues must be addressed. The occupation of Long Term Care Technician must offer sufficient opportunity for personal and professional growth to induce students to enter the training programs. Consideration should be given to:

a. The problem of career mobility: What are the defined linkages of the Long Term Care Technician position to both lower and higher nursing positions. It can offer upward mobility as an extension from lesser nursing positions, for example, LPN and nursing assistant, and could lead to higher positions such as Associate Degree in nursing and baccalaureate nursing. The linkages in the career ladder may not be 100% clear, but the training element allowing such linkages should be identified.
b. The equivalence between the Associate Degree in Applied Sciences in Long Term Care Technician and the Associate Degree in Applied Science in Nursing. Recognizing the uniqueness of the Long Term Care Technician's degree, is it possible to overlap so that the degrees are somewhat equivalent? What about the Long Term Care Technician's taking the State Nurses' Licensure examination?
c. The desirability of state licensure for the Long Term Care Technician. This would add status to the position as well as geographic mobility.
d. The development of multiple training modalities. In some states with large rural areas it may not be possible to conduct the training program from one location. Alternatives such as correspondence with preceptors should be explored.
e. The feasibility of a one-year certificate in long term care based on the same core curriculum but excluding the clinical experience of the Long Term Care Technician's program.

With all these issues addressed and questions answered the development of the Long Term Care Technician as a new occupation will be on solid ground. Preliminary observations indicate that this occupation could make a real contribution to long term care by providing needed competencies.

Therapeutic Recreation Leader. Federal legislation in the form of licensure, certification and accreditation rules and regulations requires that long term care facilities provide a program of therapeutic recreation. Most long term care facilities are not able to afford personnel possessing a bachelor's or higher degree in therapeutic recreation, and in many instances, particularly in rural areas, persons with this training are not readily available. This results in utilization of existing personnel or volunteers given minimal training and minimal supervision to conduct programs in therapeutic recreation. The need for trained personnel at less than bachelor's degree level is critical and results in a need for a formalized training program for these persons.

1. Position Description:

The Therapeutic Recreation Leader (TRL) would work directly with clients in the areas of physical activities, motivation therapy, reality therapy, arts and crafts, spiritual activities, and developing personal means for constructive use of leisure time. The TRL might assist patients who are being moved into different types of living arrangements, such as from mental health or mental retardation institutions to community settings. As with any other occupation, the duties of the TRL would vary according to the setting and the availability of other trained personnel.

Therapeutic recreation is the provision of recreation and leisure services for the ill, handicapped, and disabled and any other special populations (those groups of persons who, for physical, psychological or social reasons, can not participate in or benefit from general recreation). TRLs could be employed in all identified long term care settings with the possible exception of the home. Employers of TRLs would be agencies providing long term care for elderly and physically and mentally disabled clients. Nursing homes, group homes, hospitals, rehabilitation centers, adult day care centers, and mental health and retardation institutions are examples of sites which might employ therapeutic recreation workers.

2. Employment Outlook:

This should be a rapidly expanding career opportunity due to the increasing demand for this type of worker and lack of persons currently being trained. The trend towards deinstitutionalization has brought to light the need for assistance for disabled persons to live within the community or within the least restrictive institutional environment. These individuals increasingly need help in designing and implementing their own recreational activities.

There will be additional need to train for replacement because of the fact that persons may opt to continue training at

the degree level and because of the turnover in low-paying positions. As with other similar positions, the replacement need could be reduced through providing recognition, monetary and otherwise, to persons in these positions.

3. Education and Training Programs:

The National Therapeutic Recreation Society recommends a 750 hour training program for paraprofessionals in therapeutic recreation. Learning objectives include (recommended hours in parenthesis): orientation in therapeutic recreation services (16); agencies, institutions and teamwork involved in delivery of therapeutic recreation services to special populations (18); introduction to human growth and development throughout the life cycle (36); basic information on disabling conditions (36); communication techniques (18); dynamics of group leadership (36); recreation activity skills (180); introduction to activity analysis (18); program planning and development (36); administrative practices (16); practicum (340). Persons graduating from an approved therapeutic recreation training program may register with the Society as a Therapeutic Recreation Technician I.

The present source of workers appears to be minimally-trained volunteers of agencies who are converted to these positions in order to meet regulation requirements. There are some persons external to existing agencies who are being trained for such positions but the number is quite small.

There are no sex barriers identified with this position. Other constraints might appear in relationship to objections of professional organizations or persons trained in Therapeutic Recreation at degree levels. Current wages are probably somewhat better than minimum. Hours of the employment vary from forty hours per week to part-time. The nature of the job often requires non-typical work schedules to include weekends and evenings.

4. Implementation Strategies:

Preparing individuals at the technician level as activity coordinators for nursing homes would meet a pressing need of the nursing home industry. The federal regulations issued in 1975 require that recreation therapy activity programs in skilled nursing facilities be conducted by a trained staff member, i.e., therapeutic recreation worker, occupational therapist, or occupational therapy assistant (Bureau of Labor Statistics, 1976, p. 28). Strict implementation of this regulation could significantly heighten demand for this category of workers who are now small in number. Moreover, the training of individuals as activity coordinators might be expanded to include work with other special populations.

Nursing Home Administrator. Historically, long term care organizations have been directed by personnel with little formal training or education in the areas of management, accounting, finance or marketing. These positions have most frequently been held by owners with no particular background training or by persons educated in the biological or social sciences, such as physicians, nurses and social workers.

As health care consumes an ever-increasing portion of total federal and state expenditures, greater expertise in the business management of long term care organizations is being demanded. This is evidenced by American Health Care's projection that by 1980 all new Nursing Home Administrators will be required by states to have a baccalaureate degree prior to being granted a license (AHCA 1978). The Kellogg Foundation has recently given a grant to the Association of University Programs in Health Administration to study curricula for nursing home health administrators.

The task force workgroup emphasized that continuing education should be stressed in the long term care settings as a means to facilitate good patient care. The continuing education should be presented in the work setting as often as possible and finally, the greatest amount of continuing education should be available to and promoted for those who have the greatest amount of patient contact (see Appendix J for a more complete discussion of the need for continuing education of long term health care personnel).

1. Position Description:

The administrator is responsible for the overall operation of a nursing home. The administrator must be at ease with all sorts of people from all walks of life. He or she is daily confronted with decisions concerning the welfare of residents and the working relationships among the staff. The administrator has a demanding job in setting the pace and establishing the quality of life for residents and employees alike.

In the process of fulfilling the various demands of the top management job, the administrator plans the services to be provided, coordinates the work of the staff, directs the consultants, hires, trains and supervises new employees. The administrator must carry out these responsibilities according to the policies established by the Board of Trustees or the owner. Not the least of these tasks is dealing with the budget and monthly financial reports. Finally, the administrator must be well versed in various government regulations and programs to aid the elderly and infirm. From time to time, the administrator must deal also with the public and engage in relations within the larger community.

The nursing home administrator is an important person who derives respect from his or her staff and earns the admiration and gratitude of his or her residents (AHCA 1978).

2. Employment Outlook:

The Congressional Budget Office (1977) projections cited earlier indicated that the demand for nursing home beds will increase by +31% between 1975 and 1980 and by 87% between 1975 and 1985. The number of licensed administrators of nursing homes is expected to grow rapidly over the next decade in line with anticipated growth of the nursing home industry. The need for more assistant administrators, as the average size of nursing homes continues to grow, should cause much of the projected increase in employment (Bureau of Labor Statistics 1976, p. 37). In addition, because training in critical competency areas, such as management, accounting and marketing, has been lacking for existing nursing home directors, there is also a great need for the provision of in-service education to these personnel.

3. Educational and Training Programs:

If one accepts the fact that long term care administrators of the future will be required to possess a minimum of a four-year degree in administration, two resulting problems come immediately to mind: first, there will be a long period of time before all positions in long term care administration are held by persons with this background, yet the expectations of consumers and third party payors will be the same for all administrators; and second, health workers in middle and lower management positions have virtually no background in basic management, budgeting, and leadership skills. This divergence in orientation will serve to increase communication problems among the various levels of management, serving as a disruptive force rather than one of coordination. The end result, at least temporarily, will be increased cost of health care in long term care settings.

In view of this anticipated problem, every effort should be made to increase the administrative skills of current and future holders of middle and lower management positions in long term care settings, that is, charge nurses in nursing homes, home health and other settings. The skills of those administrators who will be "grand-fathered in" under new regulations should be increased. Several factors must be recognized before an educational program is designed to meet this need.

a. Expected wages and motivation for work of middle and lower management employees are not commensurate with the extended and in-depth program requirements.
b. Many middle and lower management employees are family wage earners and can not travel distances for a program or forego employment for additional education, even temporarily.

c. Age of the management groups may make long term education unrealistic in terms of years yet to work.
d. Financial resources for all groups may be limited in total and by time periods.

While seminars and workshops are currently available on many identified areas of concern, the task force felt that those currently available did not meet the need of the previously identified population for the following reasons: (a) cost and locations; (b) no sequential planning; and (c) wide variation in content related to sponsor and/or faculty capabilities.

Appendix J contains an analysis of the continuing education needs of personnel in long term health care, such as the nursing home administrator, and discusses the processes needed to plan to meet these specific needs.

4. Implementation Strategies:

Educational modules should be developed relative to the four major areas of management, finance, marketing and accounting. Some specific areas to be included might be: productivity as it relates to time and people management, accountability, motivation, conflict management, performance review, basic budgeting/accounting principles, policy/procedures, monitoring/surveillance of programs,etc. Development of these modules should be done by those academically prepared and familiar with business administration as it relates to health care. Once prepared these modules should be replicated and made available in community and technical colleges throughout the country at a reasonable cost, available at times convenient to employed long term care employees. Student time requirement for the entire array of modules should not exceed one year.

The task force offered these recommendations in the hope that they will improve skills of those already employed and make available these skills to persons otherwise prepared as staff but desiring promotion to lower and middle management positions. The resulting improved organizational communication efficiency and coordination of effort in long term care settings will have a positive impact on cost containment of health care delivered in these settings.

Summary

More attention has been focused on institutional long term care as the number of the elderly population have increased. Institutional care is defined as 24-hour nursing care provided in skilled nursing or intermediate care facilities. This care is provided not only to the elderly but the chronically ill of all ages. The long term care task force nominated two occupations having curriculum needs (Long Term Care Technician and Therapeutic Recreation Leader) and identified another area in need of curriculum development modules (Nursing Home Administrator).

In-Home Long Term Health Care

The development of home-based alternatives to institutional care which allow the frail, elderly and other infirm and incapacitated people to maintain a maximum degree of independence is emerging as one of the nation's major health care priorities. This section discusses first the trends, forces and factors that are and will be impacting in the home health field and the types of services and new job opportunities that seem to be developing in this area. And second, specific instructional needs related to technician level personnel for in-home care that were identified by the special task force on long term health care are described.

Conditions Affecting the Nature and Growth of In-Home Long Term Health Care

During the past decade the concept of home health care has emerged as a viable alternative for delivering health care services to needy Americans, and in-home care has received support from several important sources. Public concern over abuses in nursing homes has stimulated public and governmental interest in alternative kinds of care for the elderly. Testimony and research studies submitted to the Congressional Select Committee on Aging indicated that many of the one million or more elderly people in institutions were not receiving appropriate care and that 20 to 40 percent of the nursing home population could be cared for adequately at less intensive levels in an intermediate care facility, personal-care home, or even in the home. Moreover, as illustrated in Table III-2, there is a large unmet demand for sheltered living arrangements, congregate housing, and home health care. While great discussion has developed over home care as an alternative to institutional care, as well as the cost-effectiveness of the two delivery modes, there is a growing consensus that "care at home . . . must be considered before all other alternatives; it is more practical and economically more sound to provide care at home, when feasible, rather than to institutionalize a patient " (Visiting Nurse Service of New York 1977). Thus, older peoples' needs and the needs of the chronically disabled are translated into program support. Proposed modifications in existing federal health and welfare regulations, if enacted, would create many new jobs in the field of in-home care. Moreover, the availability of home care alternatives to institutional long term care has the potential to provide important advantages for the recipients of service, the state and federal governments, and third party payors. Two of the more apparent benefits are that home health alternatives may enable patients to avoid or delay institutionalization, and decreasing demand for nursing home beds by the frail and chronically ill may open such beds more rapidly for those awaiting placement from acute care facilities.

TABLE III-2

Long Term Care Estimated Supply and Potential Need For Calendar Year 1976 (Adults in Millions)

Type of Treatment	Estimated Potential Need	Estimated Supply
Nursing Home Care: Skilled Care	0.7	0.4
Intermediate Care	0.6	0.4
Personal Care Homes, Sheltered Living Arrangements, and Congregate Housing	1.5 - 1.9	0.3 - 0.8
Home Health Care and Day Care	1.7 - 2.7	0.3 - 0.5
Informal Family Care Only or No Care	1.0 - 4.0	3.6 - 7.2

Source: Congressional Budget Office, 1977, p. 20.

There are several cautions that need to be raised with respect to the outlook for future employment growth (for example, projections of employment requirements and job openings) for the field of in-home health care. First, the most underutilized form of long term care is in-home care (AOA, 1977, page 12). A common deterrent to allowing an elderly person to remain at home is the lack of vital services necessary to maintain the individual there. The chief obstacles in the receipt of care, identified in a recent study funded by the Health Care Financing Administration, are the lack of availability of service on a twenty-four hour basis, the lack of financial accessibility to health and social services, and the severe manpower shortage of home health aides, homemakers, and companions (Quinn 1978).

Three factors that have been identified as particularly important in influencing the demand for in-home services are: legislation, utilization, and the philosophy of care. First, since public funds are a major source of payment for health and welfare services, the projection of the number of jobs for in-home

services will depend greatly on legislative provisions governing reimbursement for specific types of in-home services. For example, the current Medicare reimbursement system has been cited as the major barrier to effective utilization both of registered nurses (RNs) in long term care facilities and the supply of non-institutional services. By reimbursing only for limited periods of home care, it has been charged that the system encourages overuse of institutional facilities and discourages the use of home services (Bureau of Labor Statistics 1977).

Since proposed changes in the Social Security Act and funding under new federal and state legislation are currently under consideration, the task of projecting the demand for in-home care is a difficult assignment. Appendix I provides an historical overview of government regulations affecting long term health care. The extent to which available public and private funds will be utilized for the services is also crucial to projection of future employment opportunities in the in-home health area. Table III-3 provides evidence that presently eligible clients and public and private service agencies have not taken advantage of existing legal or regulatory provisions under Medicare and Medicaid to provide home-based health services. Finally, the philosophy of the definition of "appropriate" care will be a third factor affecting in-home employment requirements and job openings; that is, should public funds be used to assure the least costly care or the care which most appropriately fits the recipient's needs.

Despite the problems inherent in developing coordinated social health services in the United States, the willingness in other countries to experiment with modalities is impressive. Reports on various group living experiments can be found throughout Europe; for example, in Sweden, children are paid to care for elderly, infirm parents in their own homes. Efforts in the United States, however, are negligible in contrast to those of other societies (Tobin 1978).

In conclusion, although the outlook for future employment growth for the in-home long term health care occupation area can be discussed in general terms, statistically reliable projections of employment requirements and job openings for the field are presently not possible. This is especially true given the uncertainty as to how current federal regulatory provisions restricting non-institution (that is, in-home) long term health care services will be revised.

TABLE III-3

Comparison of Titles XVIII, XIX, and XX of the Social Security Act

Social Security Act	Service	Target Group	Duration	Limits on Funds	Utilization of Home Care Provisions	Quality Control in Home Service
Title XVIII Medicare	Health (personal care)	Elderly	Short-term, acute care	Open-ended - no state matching	Underutilized	Federal standards
Title XIX Medicaid	Health (personal care)	Poor	Short and long-term (acute and chronic)	Open-ended - state matching	Underutilized	Combined Federal and State standards
Title XX (replaces Title VI)	Social (homemaking)	Poor and low-middle income	Short and long-term (acute and chronic)	Closed - state matching	High utilization	States set standards
Source: AOA, 1977, p. 11.						

Opportunities for Curriculum Development in In-Home Long Term Health Care Occupations

Presently there is not a clear understanding of the careers or occupations that will be in demand for in-home health settings. Conceptually, any chronically disabled person can be maintained or provided for at home if enough resources are expended. The most widely reported home care studies concerning the cost savings for in-home care are of short term acutely ill patients. The findings generally indicate that the cost of in-home health services is related to the level of the patient's disability (Congressional Budget Office, 1977, 61-62).

As we noted earlier, policy determinations by federal agencies over the next few years with respect to legislation and philosophy of care, and public or client responsiveness to in-home health services will determine the viability of health careers for in-home settings. Involved will be dialysis technicians, physical therapist assistants, occupational therapist systems, supplemental services assistants, and social service technicians. Thus, extreme caution needs to be exercised in projecting the future outlook for in-home health careers.

Legislation in regard to public employment programs will be an important factor. CETA (Comprehensive Employment and Training Act) often provides for public service-type jobs. If the government continues to support the concept that chronic care can be delivered more effectively and at lower costs at home, significant numbers of new job opportunities will develop in the home health field. However, although the utility of such jobs has been fairly well established, the appropriateness or suitability of these jobs for the large numbers of minimally skilled, low-income people who would be expected to fill them, has not been demonstrated. A major, unresolved policy issue is the degree to which CETA-trained clients can participate effectively in the current labor market and how successful health and social welfare agencies will be in recruiting welfare recipients for home care jobs.

The U. S. Department of Labor (DOL) is presently funding a study with the (New York) State Communities Aid Association (SCAA) that invloves a consortium of six major New York City home care and social service agencies which have hired 275 workers to perform a variety of home health tasks. The workers, 45% of whom are former public assistance recipients, are functioning as homemaker-home health aides, home attendants, handy persons, housekeepers and case aides, and they are also serving in a variety of clerical and other support positions (State Communities Aid Association 1978A). The success rate of SCAA projects is in sharp contrast to the generally dismal placement rates reported by the New York State Employment Services (NYSES). For example, SCAA reported

that while seventy thousand such welfare clients reported to NYSES offices for services during the month of October, 1977, only 5,641 were placed in jobs or training programs in all of New York State Fiscal Year 1976-77.

According to the latest Congressional Budget Office study of CETA, most evaluations of CETA Public Service Employment components have focused on job creation with less attention paid to the impact of the jobs on the economic circumstances of participants and almost none to the value of the services (1978, page 17). The Department of Labor is presently sponsoring a second CETA, Title VI Research Study in New York State that focuses on both the employment and the service issues: employment alternative to public assistance, and health care for the elderly with marginal income (State Communities Aid Association 1978B). SCAA anticipants will provide essential home health care and housekeeping services to a substantial portion of the estimated 30,000 - 50,000 marginal income, frail elderly and other infirm and incapacitated New York City residents who are ineligible for Medicaid and are unable to purchase private care.

To provide a framework for the discussion of occupations in the in-home health setting, a tentative continuum of possible in-home health services was developed. The four major types of services listed in Table III-4 were identified by one of the work groups from the special task force meeting described in Chapter II: (a) supplementary services; (b) homemaker - home health aide services; (c) professional and related technician services; and (d) combination of in-home and community care services.

The remaining sections of this chapter focus on a detailed discussion of employment elements and curriculum development needs for the first two types of service. A few comments need to be stated with regard to the latter two types, namely, professional and related technician services and the combination of in-home and community care services. While a number of health services conceptually can be merged into an in-home health care model, the special task force had a difficult time projecting the employment requirements and job openings for in-home technician level services in established professional specialties. Six technician level occupations were discussed at length in work groups, but the general consensus was that either adequate programs were currently available or that more information about employment demand and professional group recognition of the technician position was needed. The six occupations were: dialysis technician; food service or dietetic technician; occupational therapist assistant; physical therapist assistant; respiratory technician; and social service technician.

There were two problems which constrained the special task force's consideration of employment demands and curriculum development needs for in-home long term care. First, the patterns of preparing for careers in this occupational area are still evolving

Table III-4

Continuum of In-Home Health Services

for the In-Home Long Term Health Care Setting

- Supplementary Services
  - Friendly Visitors Program
  - Telephone Reassurance
  - Chore
  - Meals-on-Wheels
  - Transportation and Escort
  - Outreach
- Homemaker-Home Health Aide Services
- Professional and Related Technician Level Services (by any and all of the following and/or their assistants or technician level counterparts)
  - Social worker/technician
  - Psychologist/technician
  - Nutritionist/technician
  - Physical-occupational-speech therapist/technician
  - Visiting registered nurse/technician
  - Physician/technician
- Combination of In-Home and Community Care Services
  - Day care
  - Day hospital
  - Hospice

and are subject to a great deal of discussion and debate. And second, the group found it extremely difficult at this time both to predict the configuration of technician level health care services for the in-home setting and to estimate the demand for these services that will be reduced if government financial support of in-home (or non-institutional) long term health care were to increase.

Within this context, the task force did recommend that two types of national curriculum development seem to be warranted. Both options focus on the development of crucial modules of instruction on training to prepare needed personnel for the provision of care for the older adult at home: homemaker-home health aide; and supplemental services assisting (for the in-home long term health care setting).

The area of combined in-home and community care services was not adequately addressed during the task force meeting although it was given general consideration in the construction of the matrix of long term health care settings and potential target populations described earlier. A good reference that does treat the relationship between in-home services and those in a day hospital or day care center is the Brahma Trager (1976) working paper prepared by the Special Committee on Aging. Similarly, the hospice movement will need to be investigated as a type of long term care that, if federal health services reimbursements are allowed, will be growing over the next decade. This seems to be an important area that will warrant continuous monitoring and analysis in subsequent years.

Homemaker-Home Health Aide. This occupational title is a generic term embracing a job which sometimes has other titles such as, "homemaker," "home health aide," or "home help". Under any title, homemaker-home health aide service helps families remain together and elderly persons stay in their own homes when health and/or social problems strike, or when individuals need to return to their own homes after specialized care. The trained homemaker-home health aide who works for a community agency carries out assigned tasks in the family's or individual's place of residence, working under the supervision of a professional person who also assesses the need for the service and implements the plan of care.

1. Position Description:

The role of homemaker-home health aide is closest to that of the natural care-giver in the home. Unless basic homemaking and personal care needs are met, professional therapy is useless. The homemaker-home health aide, like the care-giving family member, has a central role. The homemaker-home health aide is, however, in the home of individuals who are weak enough to be dependent on others and are, therefore, vulnerable to mishandling and abuse. The homemaker-home health aide must have training to

cope with a variety of tasks and situations and must work under a plan of care for which an appropriately educated professional is responsible.

There are two notable differences between in-home and institutional care. First, the service can be more precisely tailored to the needs of the individual in his or her home; that is, what the individual or family can do or be taught to do for themselves can be utilized to the maximum in establishing the care plan; and second, a frail person is more vulnerable to abuse and neglect within the seclusion of the home. These differences mean that mechanisms for accountability are even more critical in a system of home care than in other systems (National Council 1977).

In Table III-5 homemaker-home health aide activities have been grouped in four basic areas: performing director services; observation and feedback; teaching: acting as a role model; and use of relationship in treatment.

Some agencies base a career ladder for their homemaker-home health aides on the competency developed through training and experience. A typical career ladder related to the foregoing cluster of activities might include:

a. Homemaker-home health aide I: the beginning aide provides housekeeping, homemaking, and personal grooming and has a beginning competency in observation and feedback and the use of the helping relationship.

b. Homemaker-home health aide II: this intermediate level of personnel provides all of the above and in addition gives personal care based on a medical care plan, provides observation and feedback, and uses the helping relationship in treatment.

c. Homemaker-home health aide III: the advanced aide provides all of the above as well as teaching role modeling. The advanced homemaker-home health aide may have special training in working with specially complex individuals and family situations--terminal illness, mental illness, neglect/abuse of children.

Some experienced homemaker-home health aides are trained to become field counselors, to work with the professional supervisor or case manager to perform some of the supervisory tasks.

A homemaker-home health aide may serve a specific area such as a single-room occupant apartment house or an apartment house in which elderly residents live. The aide may also work in an apartment which is not a family home as it is generally conceived. For example, it may be an apartment set up for several patients discharged from a hospital for mentally ill people.

Table III-5

Homemaker-Home Health Aide Activities

Performing Director Service

a. Housekeeping: light cleaning of the house, light laundry, clothing repair, ironing, etc.

b. Homemaking: child care, money management, food planning and shopping, cooking, etc.

c. Personal care: bathing, dressing, feeding, assisting with ambulation, hair washing and setting, etc.

Observation and Feedback

Observing significant client behavior that should be reported to the case manager or supervisor.

Teaching; Acting as a Role Model

a. Demonstrating how to perform housekeeping, homemaking, child care and personal care tasks (indirect teaching).

b. Teaching planned instruction in methods of housekeeping, homemaking, child care, personal care, etc. (direct teaching).

Use of Relationship in Treatment

a. Presence and support: the homemaker-home health aide's conscious use of self to provide psychological support to the client through presence and accessibility.

b. Therapeutic socialization: the homemaker-home health aide's conscious provision of encouragement and praise for the client's accomplishments.

c. Therapeutic actions and intervention; the homemaker-home health aide's pre-planned activities performed under direction of a nurse or social worker which are designed to augment or expand a medical or social service treatment plan, including participation in case review and planning meetings.

Source: National Council 1978B.

The homemaker-home health aide must always be guided by an assessment and plan of care developed by an appropriate professional--most often a social worker or nurse. The professional takes responsibility for seeing that the plan of care is followed, conducts periodic reassessment, and maintains the plan of care current with changes in the situation of the individual and family.

The homemaker-home health aide is employed by an agency under public, voluntary, non-profit, private non-profit,[17] or proprietary auspices. The service may be in a health or welfare related multi-program agency or in a free-standing homemaker-home health aide agency.

Many homemaker-home health aides have been homemakers for their own families, who no longer need their full-time attention; however, adults of all ages and many backgrounds find a role as homemaker-home health aides. Although most are women, an increasing number of men are being employed.

Many agencies employ aides on a part-time basis so that individuals wishing to work only certain days or certain hours may be accommodated. The majority of service is provided during regular working hours on weekdays; however, there is a need for service on weekends and at night, and agencies will increasingly be asked to provide it.

Wages vary from the minimum wage to $4.00 and more per hour. Benefits vary even more. Usually wages and fringe benefits are highest in unionized agencies.

2. Employment Outlook:

In 1966, the National Council for Homemaker-Home Health Aide Services reported 800 programs in the United States and Canada; in 1973, 1714 programs. In 1977, the National Council located 3,700 homemaker-home health aide programs in the U. S. and Canada. The Council's 1978 census update--which is still in progress--indicates that there are as many as 5,000 programs in the United States and Canada providing some form of the service (National Council 1976).

---

[17] An Internal Revenue ruling makes it possible for a privately owned corporation to incorporate as a private-not-for-profit agency as long as the agency does not show a profit at the end of the year. Excess of income is put into salaries or property or expended in some other way.

In spite of the remarkable growth, particularly when compared with many western European nations, the United States is seriously behind in its development of in-home services for the aged and others. Sweden, Finland, and the Netherlands all report a ratio of one homemaker-home health aide for every 150 persons. The United States provides one aide for approximately 2,500 individuals.

In the 1977 census it was learned that the number of aides employed by these programs had risen from 43,000 in 1972 to 82,000. Fifty percent of the agencies reported employing five or fewer homemaker-home health aides. Altogether, an estimated 85 million hours of service are being given each year.

About 16 percent of all the programs located through the 1977 census were free-standing homemaker-home health aide agencies. The remaining programs were split evenly between those lodged in health-related organizations (such as departments of health, visiting nurse associations and hospitals) and those lodged in social welfare-related organizations (such as departments of public welfare and family service organizations). Each represented 40 percent of the home care field, with 4 percent classified as "other."

The 1977 census also showed a marked concentration of home care programs in urban areas. Only half of the proprietary agencies reported serving rural areas. In fact, 67 percent of the proprietaries reporting were in cities of one-half million or over. Public agencies fared better--86 percent of them serve rural parts of the country but often with tiny units. Although it is more costly to serve rural areas, a tremendous need exists within remote, rural areas as well as within decaying urban centers where many elderly persons live isolated and alone.

In spite of the mounting evidence of the almost limitless value of supportive, in-home assistance, a mere fraction of those persons who could benefit from it is being served. The latest research indicates that there is a population of from 1 to 2 million adults in the United States not receiving the home care they need. Another 3 to 8 million persons who are functionally disabled receive no long term care whatsoever under governmental programs. Countless other families with children, handicapped, chronically ill, mentally ill, and terminally ill individuals of all ages are going unattended.

A Bureau of Labor Statistics (BLS) researcher, using the National Council's 1973 census as a basis, projected the requirements for total number of homemaker-home health aides, assuming that client use of available resources would be maximized (see column "II" in Table III-6), in 1990 to be 198,000. BLS also

Table III-6

Projections of Requirements for Homemaker-Home Health Aides, Under Various Assumptions, 1980, 1985, and 1990

	Assumptions	Requirements Projections			
		1980	1985	1990	Base Line
I.	No change.....	63,000	67,500	72,000	Base Line
II.	Change utilization only.....	132,000	178,000	198,000	Judgment Projection
III.	Change utilization and legislation only....	135,000	218,000	253,000	Alternate Projection
IV.	Change utilization, legislation, and philosophy of appropriate care.....	140,000	310,000	386,000	Upper Limit

Source: AOA 1977.

projected annual openings from 1980 to 1985 to be 9,200 for growth, 31,000 for replacement, totaling 4[illegible],200. In addition, if the proposed modifications in federal Medicare and Medicaid requirements are promulgated, as anticipated, BLS projected (see column "III" in Table 3) that an additional 45,000 openings will be realized by 1985 and an additional 15,000 - 55,000 openings by 1990.

3. Education and Training Programs:

The individual applying for work as a homemaker-home health aide should be able to read and write. Some agencies require the individual to have a high school diploma or its equivalent. A homemaker-home health aide program applying for approval or accreditation by the National Council for Homemaker-Home Health Aide Services must insure that its aides have initial generic training of at least forty hours within the first six months of

employment. In addition to the initial generic training, the agency should insure that regular in-service training, at least four times a year, reinforces and extends the initial generic training. The homemaker-home health aide working with special disabilities needs training specific to the situation.

Several good training manuals used for providing the initial generic training are now in use. A new one with a sixty hour curriculum plus a fifteen hour practicum has just been developed by the National Council for Homemaker-Home Health Aide Services under a grant from the Public Health Service and is being field-tested. New criteria for conformity to the training standard will probably be based on the new manual (National Council 1978B).

Much needed are training modules to add on to the initial generic training for the homemaker-home health aides. These modules should be designed for two kinds of training: (1) regular in-service classes to follow up on the initial generic training, and (2) classes for homemaker-home health aides working with clients who require special skills in handling.

The National Council recently received a grant to develop a module on developmental disabilities. Other modules needed include those concerning terminally ill persons, mental health-disabled persons, and treatment for persons with specific illnesses, particularly respiratory diseases and diseases involving muscular degeneration. Modules to be used with the advanced homemaker-home health aide who is teaching and role-modeling, as well as assisting, would include materials for working in the homes of newly disabled individuals, working with very disorganized parents, and in other situations of child neglect/abuse.

A manual for training homemaker-home health aides to become field counselors has been developed by a Council-accredited agency in Cincinnati (Mootz 1976). More materials to be used for this group would be useful. Materials to train professional supervisors to work with non-professionals and to use current techniques in goal setting and in handling of personnel time and money are needed.

The development of modules for training supervisors and the consequent expansion of those materials would be useful. Eventually, it might be feasible to have several regional centers for training homemaker-home health aide supervisors for their specific roles.

Training for administrators of homemaker-home health aide programs and agencies is also needed. Under a W. K. Kellogg grant, the Association of University Programs for Health Adminis-

trators is developing a module or modules for training home health administrators. This may be a useful basic curriculum to which specific training to work with a homemaker-home health aide program could be added. The need for other modules could be documented through a survey of agencies.

4. Implementation Strategies:

Aide to the elderly and the sick has been identified as a major category of jobs for CETA (Comprehensive Employment and Training Act) projects. For example, in West Palm Beach, Florida, CETA workers have been trained to assist the elderly by doing such tasks as heavy cleaning, cooking meals, and providing transportation to doctors' offices. The Department of Labor has projected that 200,000 jobs and training slots in the area of aiding the elderly and the sick can be accomplished under CETA by 1981 (U.S. Department of Labor 1978). Similarily, the State Communities Aid Association projects (1978A and 1978B) discussed previously ought to be monitored in terms of the lessons learned and successful strategies identified with respect to training low income, unemployed individuals to perform a variety of home health tasks. The training of homemaker-home health aides seems to offer an excellent opportunity for collaboration between education agencies and CETA prime sponsors.

Supplementary Services Assisting.[18] An individual who is dependent because of age, illness or disability, or the inability of the family to provide all the care needed, may still remain at home if the needed services are available. Six supplementary in-home services can be identified: friendly visitors, telephone reassurance, chore assistance, meals-on-wheels, transportation and escort, and outreach. Supplementary services must be carefully planned so that they are readily available and accessible throughout a geographic area. They should be an integral part of the network of health and social services in the community. When more than one agency is involved in the delivery of supplementary services to a family or individual, the responsibility must be clearly delineated and assumed by one agency.

The most vital safeguard in the provision of in-home care, as in institutional care, is that someone with appropriate professional knowledge assumes responsibility for the assessment, plan of care, and regular reassessment of every individual served. The plan of care provided in the home must take into account the

---

[18]Material on supplementary services, except "outreach," contained in this report has been adapted directly from The National Council on Homemaker-Home Health Aide Services Supplementary Services Guidelines (1977).

support available to the individual as well as any special needs. It may be as harmful to provide too much service as too little, for too much can increase the dependence of the person served and may hinder recovery and rehabilitation. Due to the more recent development of these in-home supplementary services, less detail is available concerning position descriptions and employment outlooks. A brief program description and delineation of needs for education and training follows.

1. Program Description:

Six supplementary in-home services can be identified and described. First, the friendly visitor program is one in which volunteers visit on a regularly scheduled basis handicapped, chronically ill, or older persons who live alone or are lonely for companionship. Visits should be made at least once a week and more frequently if both the volunteer and visited person so wish. Visits may include services by the volunteer, such as writing letters, shopping, sewing, and reading.

Second, a telephone reassurance program provides calls seven days a week at a prearranged time to ill, disabled, or elderly persons who live alone. The purpose of the calls is to determine each person's condition and to provide community contact over a sustained period of time. Through these calls an emergency requiring prompt medical or other intervention may be discovered in time to prevent suffering or death.

Third, a chore service program provides help with minor home repairs, heavy house cleaning, and yard tasks which need to be carried out intermittently to maintain persons safely in their own homes. It does not include personal care. Chore services fall into three categories: minor home repairs, heavy cleaning, yard and walk maintenance. An important secondary goal of a chore service program is to provide employment for older persons who for various reasons do not desire, cannot find, or are no longer able to handle a full-time job.

Fourth, a meal-on-wheels program is a service in which prepared, nutritious meals are delivered directly to the residence of ill, handicapped, or elderly home-bound persons who are unable to prepare or obtain their own meals. It provides isolated men and women with adequate nutrition and the opportunity to eat hot meals. This service often forestalls premature institutionalization. Provision of a hot meal may mean that an ill, handicapped, or elderly person can return to the community after hospital treatment instead of being required to spend several weeks in a nursing home.

Fifth, transportation and escort services provide assistance to persons who require help to get where they need to go. When necessary, an escort helps the individual secure the needed service by accompanying him/her and assisting in his/her safe return home. The service can function as a taxi designed to meet the personal transportation needs of an individual or as a group service that is destination-oriented.

Escort service is a person-to-person service to the elderly, handicapped, or chronically ill, many of whom will not or cannot venture out without assistance. The service may provide assistance in the areas of physical limitations, language translation, help with shopping, emotional support and encouragement, or protection.

And sixth, the purpose of outreach services is to extend an agency's capability to inform the most needy in a community of the available services. Outreach services often involve knocking on doors in specific neighborhoods and introducing oneself as a representative of a given social service agency. An explanation of services for which the individual may be eligible is provided. This type of "reaching out" is necessary in the cases of isolated or ill elderly persons who may have little contact with or understanding of social service delivery systems.

2. Employment outlook:

The viability of supplementary services will be predicated on the reimbursement for services that the major medical coverages will allow. As cited earlier in Tables III-2 and III-6, in-home care is the most-underutilized form of long term care, with their being a shortage in care for .7 to 1.6 million adults, and it is also an area that will experience strong growth as well as replacement employment opportunities over the next decade.

3. Education and Training Programs:

Those who are likely to be most in need of one or more supplementary services are the elderly, usually those living alone or with an equally frail companion, and others in similar circumstances who are chronically ill or disabled. Therefore, prior to beginning their work, those who are going to provide services to these vulnerable persons should receive orientation as to ways in which aging and handicapping conditions affect physical and emotional states.

This orientation can have essentially the same context regardless of which service the volunteers are going to provide. It should be conducted by professionals who have knowledge about gerontological and physical conditions from the perspective

of the physician; nurse; psychologist; physical, speech or occupational therapist; nutritionist; and social worker. Content for this general orientation is available in most communities and from the national health organizations or area agency on aging. It is likely that this general orientation can be accomplished in two one-half day sessions. This assumes regular ongoing in-service training for further orientation and group discussions to broaden understanding and to gain further insights.

Those who are assigned to particular supplementary services should have another period, the equivalent of about two one-half day sessions, of orientation in the particular aspects of their service that are somewhat different, such as delivering meals. (The exception to this would appear to be friendly visiting and telephone reassurance which might be given together since they are so similar in their requirements.) Orientation in the office and other procedures, such as the simple reporting they are being asked to do, also could be provided at this session. Background materials, provided they are well prepared and are not too lengthy, are useful for workers to take with them for future reference.

4. Implementation Strategies:

National, state, and local organizations have developed guides for training volunteers and employees in providing specific supplementary services.

Although the coordinators of the supplementary services often have professional degrees in social work or nursing, their training often has included very little regarding working with volunteers and non-professionals. Therefore, with an increasing demand for services to maintain individuals at home and a large group of retired people who want to keep occupied, the demand for supplementary services must grow. (See previous discussion of six supplementary in-home services.)

A useful step would be the review of those training materials which have been developed by various sources. Any missing pieces could be supplied and the selected parts put into a training manual which could be used to prepare coordinators and the volunteers and employees who provide the service. This could be used with Supplementary Services: Guidelines (National Council 1977).

Summary

The development of home-based alternatives to institutional care allow frail, elderly, and other infirm and incapacitated persons to maintain a maximum degree of independence. Although the

outlook for in-home long term care can be discussed, statistically reliable projections of employment requirements and job openings are presently not possible. Needs for curriculum development were identified for the homemaker-home health aide and supplemental services assistants. These needs were identified with caution because of the influence that any future government support in this area may have.

References

Institutional Long Term Health Care References

AOA Occasional Papers in Gerontology, No. 1. Manpower Needs In The Field of Aging: The Nursing Home Industry. Washington, D.C.: Office of Human Development, Administration on Aging. DHEW Publication No. (OHD) 76-20082, 1976.

AHCA (American Health Care Association). Health Careers. Washington, D.C.: American Health Care Association, 1978.

"Americans: How Drastic Shifts In Demographics Affect The Economy." Business Week, February 20, 1978, 64-69.

Brotmann, Herman B. "The Aging of America: A Demographic Profile." National Journal, October 7, 1978, 1622-1627.

Bureau of Labor Statistics, U.S. Department of Labor. "Special Issue: Working With Older People." Occupational Outlook Quarterly, Volume 20, Number 3, Fall 1976.

CAHEA (Committee on Allied Health Education and Accreditation). Allied Health Education Directory/7th Edition. Monroe, WI: American Medical Association, 1978.

Congressional Budget Office. Long-Term Care for the Elderly and Disabled. Washington, D.C.: U.S. Government Printing Office, February 1977.

Humana Inc. 1977 Annual Report. Louisville, Kentucky: Humana Inc., November 1977.

Medicus. The Training of Unlicensed Long-Term Care Personnel, HRA 230-76-0272. Quarterly Report. June, 1977 - August, 1977.

"The Politics of Aging". Society, Volume 15, Number 5, July - August, 1978, 22-75.

U.S. House of Representatives. Select Committee on Aging. Annual Report for the Year. Washington, D.C.: U.S. House of Representatives, Select Committee on Aging, 94th Congress, First Session, 1976.

U.S. Senate. Subcommittee on Long-Term Care of the Special Committee on Aging. Nursing Home Care In The United States: Failure in Public Policy. "Introductory Report." Washington, D.C.: U.S. Government Printing Office, 1974.

U.S. Senate Subcommittee on Long-Term Care of the Special Committee on Aging. Nursing Home Care In the United States: Failure in Public Policy. Supporting Paper No. 1: "The Litany of Nursing Home Abuses and an Examination of the Root of Controversy." Washington D.C.: U.S. Senate Special Committee on Aging, 93rd Congress, Second Session, 1974.

In-Home Long Term Health Care References

AOA Occasional Papers in Gerontology, No. 2. Manpower Needs In The Field of Aging: Homemaker - Home Health Aide Services. Washington, D.C. Office of Human Development, Administration on Aging, DHEW Publication No. (OHD) 77-20086, 1977.

Aschenbrener, Thomas. Bureau of Health Manpower, Washington, D.C. Personal Conversations between October and December 1978.

Bernier, E.M. and Quinn, J.L. "Appropriate Health Care for the Elderly: Service Utilization and Costs--Two Replications." Plainville, CT: Triage Inc., June, 1978.

Bureau of Labor Statistics. U.S. Department of Labor. "Human Resource Issues in the Delivery of Social Services to the Elderly: A Report of Hearings Conducted By the Commissioner on Aging." Prepared for the Administration on Aging. February, 1977.

Bureau of Labor Statistics. U.S. Department of Labor. "Special Issue: Working with Older People." Occupational Outlook Quarterly. Volume 20, November 3, Fall 1976.

Congressional Budget Office. CETA Reauthorization Issues. Background Paper. August, 1978, p. 17.

Congressional Budget Office. Long-Term Care for the Elderly and Disabled. Washington, D.C.: U.S. Government Printing Office, 1977.

Home Health--The Need For a National Policy to Better Provide for the Elderly. Report to Congress by the Comptroller General of the United States. December 30, 1975.

Mootz, A. Outline of Staff Development Program for Field Counselors and Senior Specialists. Cincinnati, Ohio: Home Aid Service, 1976.

National Council for Homemaker-Home Health Aide Services, Inc. A Model Curriculum and Teaching Guide For the Instruction of the Homemaker-Home Health Aide. New York City: National Council for Homemaker-Home Health Aide Services, Inc., September, 1978A.

National Council for Homemaker-Home Health Aid Services, Inc. The Administrator's Manual--A guide to Planning, Organizing And Administering Homemaker-Home Health Aide Service. New York City: National Council for Homemaker-Home Health Aide Services, Inc. Manuscript in draft, 1978B.

National Council for Homemaker-Home Health Aide Services, Inc. Supplementary Services: Guidelines For Services Supplementary to Home Health and Homemaker-Home Health Aide Services. New York City: National Council for Homemaker-Home Health Aide Services, Inc., 1977.

National Council for Homemaker-Home Health Aide Services, Inc. Report On a Census of Training Programs For Homemaker-Home Health Aides In the United States and Canada. New York City: National Council for Homemaker-Home Health Aide Services, Inc., 1976.

Quinn, J. L., "Home Care For the Elderly: The Need For a National Policy." Testimony to the U.S. House of Representatives. Select Committee on Aging, February 22, 1978.

Social Security Administration. Medicine: Utilization of Home Health Services, 1974.

State Communities Aide Association (formerly State Charities Aide Assocation). "CETA Public Service Employment In The Home Care Field: A Study Of the Implication In Services, Costs And Job Placement." Submitted to Office of Research and Development and Training Administration, Department of Labor, May, 1978A.

State Communities Aide Association (formerly State Charities Aide Association). "Proposal: An Evaluation of Public Service Employment In the Home Care Field." Submitted to Office of Research and Development, Employment and Training Administration, Department of Labor, October 1978B.

State Communities Aide Association. Report of Arden House Institute on Continuity of Long-Term Care, December 18 - 20, 1977.

"The Politics of Aging". Society, Volume 15, Number 5. July - August, 1978, 22-75.

Tobin, Sheldon S. "The Politics of Aging - The Mystique of Deinstitutionalization." Society, Volume 15, Number 5, July - August, 1978, 73-75.

Trager, B., Adult Day Facilities For Treatment, Health Care and Related Services: A Working Paper. Prepared for Use by the Special Committee on Aging of the United States Senate, September, 1976.

U.S. Department of Labor. "RFP for Research on the Labor Market Impacts Of the Employment Opportunity Pilot Projects." ETA/OPER RFP 7817, 1978.

U.S. General Accounting Office, Home Health--The Need for A National Policy to Better Provide For the Elderly, December 30, 1977.

Visiting Nurse Service of New York. "Home Health Care: Its Utilization, Costs, and Reimbursement." November, 1977.

CHAPTER IV: OTHER ALLIED HEALTH, OCCUPATIONAL SAFETY AND HEALTH, AND ALTERNATIVE ENERGY AREAS

Information on three new and changing occupational areas is presented in this chapter: (1) allied health (other than those related to long term health care previously discussed in Chapter III); (2) occupational safety and health; and (3) alternative energy. The forces, factors and trends affecting the growth of these three occupational areas and identified opportunities for vocational education curriculum development are discussed. The findings reported in this chapter were assembled relying only on a secondary analysis of existing occupational information and curriculum sources. Whenever it is available, information is included on specific position descriptions, employment outlook and existing training.

Other Allied Health Areas

Conditions Affecting the Nature and Growth of Other Allied Health Areas

As a result of general population growth, the public's increasing concern for health care, and changes in health delivery systems due to pressures for cost containment, the allied health occupations will represent faster-than-average growing employment opportunities through 1985. According to unpublished Bureau of Labor Statistics (BLS) data for the occupational industry matrix (1978), occupations in the health area are expected to grow by 42.44 percent between 1976 and 1985 as compared to a 35.44 percent change from 1970-1976. For the technologists and technicians covered by the to-be-published BLS data, the percent change for 1976-1985 is below that for 1970-1976; but the present change is still greater than the average expected for all other occupations. The BLS health projections, as illustrated in Table IV-1, focus on well-established occupations, not on those occupations that are characterized as new and changing. Nonetheless, it is possible to obtain a general employment trend for the allied health occupations.

Along with the rapid growth within occupations in the allied health field, there has also been rapid growth in the number of occupations. For instance, one accrediting agency, the Committee on Allied Health Education and Accreditation of the American Medical Association (AMA) reports that from 1933 to 1967 the Council on Medical Education of the AMA collaborated in the accreditation of eight different kinds of allied medical education programs. From 1967 to 1976 the number of programs the Council was involved in increased to twenty-four with ten of these programs or occupations surfacing in the last three years (American Medical Association 1978). Appendix K contains a list of accrediting allied health agencies recognized by the Accreditation and Institutional Eligibility Staff of the U.S. Department of Health, Education and Welfare as of June 1975.

Table IV-1

Total Employment by Occupation
for Health Technologists and Technicians

Occupational Title	1970 Employment Number	1970 Employment Percent	1976 Employment Number	1976 Employment Percent	1985 Employment Number	1985 Employment Percent	Percent Change 1970-76	Percent Change 1976-85
Health Technol. & Technician	245,765	5.31	393,616	6.28	544,834	6.10	60.16	38.42
Clinical Lab Technol. & Techn.	123,250	2.66	186,754	2.98	261,250	2.92	51.52	39.89
Dental Hygienist	15,180	0.33	25,449	0.41	55,000	0.62	67.65	116.12
Health Record Technol. & Technician	11,632	0.25	15,744	0.25	20,800	0.23	35.33	32.11
Radiological Technol. & Techn.	51,181	1.11	80,555	1.28	111,000	1.24	57.39	37.79
Therapy Assistant	3,115	0.07	3,291	0.05	4,500	0.05	5.65	36.74
Other Health Technol. & Techn.	41,407	0.89	81,823	1.30	92,284	1.03	97.61	12.78

Source: Bureau of Labor Statistics 1978.

Several conditions have accompanied this rapid proliferation of numbers and occupations. One condition is what J. Warren Perry, (1977), past editor of the Journal of Allied Health, calls "the identity of 'one' syndrome"; personnel identify with a singular health profession, through professional associations, etc. Some call it "protecting turf", but it often results in a minimum of interdisciplinary approaches. There is a noticeable trend among some professionals to counteract this "'one' syndrome".

A second condition identified by Perry is the blurring of professional roles. A detailed look at existing curricula would show many similarities of content. An example of this is the existence of many varieties of "assistant to" the primary care physician. These have included "physician's assistant" and "psychiatric assistant" among other occupations. A current project at the Ohio State University School of Allied Health will be identifying the common competencies across several allied health occupations.

From this blurring of professional roles, with several occupations performing similar tasks, comes the "drive for professional independence". This drive for professional independence relates to the desire to be recognized as an independent occupation, to be part of an independent professional occupation, and to have independently-accredited programs (Perry 1977).

It should be noted that several health regulatory agencies are concerned with the proliferation of health occupations and the resultant stress of accreditation responsibilities of institutions sponsoring the education programs. Examples of groups concerned with this include the Council of Postsecondary Accreditation (COPA), the American Medical Association and the Committee on Allied Health Education and Accreditation (CAHEA). One of the newer occupations discussed below, the multi-competency technician, would seem to respond to this concern, although the real need for this occupation is based on other concerns.

Opportunities for Curriculum Development in Other Allied Health Areas

The occupations discussed below represent various stages in the development of allied health occupations, from just-beginning to fully-developed-but-changing in technology and demand. Historically, new allied health occupations have developed as a result of physicians' identifying a need for a new helping role. Most of the early training programs were conducted in hospitals and were not clustered into any coordinated pattern; eventually, the responsibility for training moved to the educational community.

The allied health area is one occupational area that is projected to continue to grow over the next decade; a 38.42 percent change is predicted between 1976 and 1985. Accompanying this rapid growth is an increase in the number of occupations in this area. Two new and changing occupations that have curriculum development needs are the multi-competency technician and the diagnostic medical sonographer.

Multi-Competency Technician. The occupation of multi-competency technician is developing as a response to the medical needs of rural and small health facilities and hospitals. Many rural facilities cannot afford to hire separate individuals to fill separate allied health positions. Therefore, employing one person who is capable of performing a variety of technical operations can be a significant cost saving.

1. Position Description:

The multi-competency technician is an allied health generalist possessing skills in more than one specific technician-level health area. For instance, a multi-competency technician may receive training in medical laboratory and respiratory therapy or may receive training in medical assisting and radiographic techniques. Job duties would depend on the chosen combination of skills. This is a cost containment effort.

2. Employment Outlook:

As indicated above, the BLS projections for other health technologists and technicians support this occupation as a growing occupational area. In addition, the pending approval by the Committee on Allied Health Education and Accreditation (CAHEA) will be a major stimulus to provide acceptance of this multi-specialist, especially where needs are greatest, such as in rural and highly depressed urban areas.

3. Education and Training Programs:

At the present time there are six or seven known programs that seem to represent six to seven different educational models to prepare multi-competency technicians. A sampling of the programs is given below.

Southern Illinois University has developed an educational model based on an outreach method of training. This development was funded under a grant from the Bureau of Health Manpower. Participants in the program choose two of a possible three areas in which to develop skills. The three areas are: medical

laboratory, respiratory therapy, and x-ray. Students learn on the job site with slides, audio tapes, and textbooks. Supervision is provided by a hospital supervisor and by the Southern Illinois staff (Heath 1978).

The University of Alabama in Birmingham has developed a different type of educational model to develop a different set of skills for a "multiple-competency technician". Here the technician receives technical skills training in medical assisting, basic laboratory procedures, and radiographic techniques; the program is closely identified with their medical assistant program. There are two phases to the program; a pre-technical phase that the student completes in a junior college near his/her hometown and the technical phase, taken from the regional technical institute (in this case, the University of Alabama). The technical phase includes clinical work. A certificate is awarded upon successful completion of the program.

A third program is one for allied health generalists at the School of Allied Health Sciences at the University of Texas Medical Branch. The program is designed to prepare health professionals to assume additional roles and responsibilities in health care. The program gives an individual with an associate degree in a technical health field an opportunity to earn a baccalaureate degree while remaining employed on a full-time or part-time basis. The program was initiated in 1975 ("Educational Opportunity for Mid-Career Adults" 1978)

Developers of these programs recognize the problems involved in developing the multi-competency technician to the status of a recognized occupation. Need is not one of the problems; the need for this individual exists in rural areas and in small hospitals and health facilities. Problems exist primarily with existing health organizations which feel that programs may be producing less competent technicians due to the "watered down" curriculum. The suggestion has been made that the organizations work directly with professional groups when developing programs to develop proficiency examinations that will assure acquisition of the necessary credentials. Licensure requirements in states will also need to be examined and in some cases modified. Hospital accreditation standards will need to be reviewed and modified to permit different but appropriate staffing requirements.

It is interesting to note that the need for a similar occupation of a generalist or multi-competency technician was recognized by the project's long term health care task force.

Diagnostic Medical Sonographer. Diagnostic medical sonography represents a medical area that has undergone and continues to undergo rapid technological advances. The occupation of diagnostic medical sonographer has emerged in the last ten to twelve years with the development of diagnostic ultrasound techniques and specialists in this area. Ultrasound procedures include the use of high frequency sound waves to image organs, masses and fluid accumulations within the body. These images provide diagnostic information. The field of diagnostic medical sonography is expected to grow at a rate much faster than the average of all other occupations.

1. Position Description:

A diagnostic medical sonographer prepares patients (preparation includes reviewing/recording patient history and explaining procedures to the patient), performs the ultrasound scans, and records observations and clinical and sonographic data for presentation to the physician. Duties might also include clerical work and record keeping. The sonographer works under the direct supervision of a doctor of medicine or osteopathy.

The increased use of diagnostic ultrasound in medicine has prompted the use of specialized personnel. The sonographer may work in a variety of specialty areas including abdominal medicine, cardiology, neurology, obstetrics/gynecology, and ophthalmology. The techniques utilized may differ depending on the specialty.

The sonographer may also work in a variety of settings.

a. In medical settings: sonographers perform the duties as described above.

b. In industry: graduate sonographers are employed as technical advisors and representatives for ultrasound equipment and supply manufacturers.

c. In government: sonographers who choose to work with the federal government may find employment opportunities in the Veteran's Administrations, United States Public Health Services and Armed Forces hospitals both here and abroad.

d. In technology education: Faculty positions are open in hospitals and university schools. These include supervisors, instructors and directors of education. The need for large numbers of adequately prepared instructors in the field of ultra-sound technology is acute and this need promises to continue. (American Society of Ultrasound Technical Specialists 1978).

Salaries are comparable to those in other fields where longer and more specialized training is required. As a sonographer becomes more experienced or becomes a specialist, his/her salary increases proportionately. Salaries in industry may be somewhat higher. Average annual salaries in the field of ultrasound technology vary between $9,000 and $25,000. A recent survey conducted by the American Society of Ultrasound Technical Specialists indicated a nationwide average salary of $13,764 (1978).

2. Employment Outlook:

As noted earlier, the ultrasound technician is a rapidly growing and changing occupation. Currently, a wide variety of programs with different emphases and requirements exist across the country. Based on the acceptance of essentials by Committee on Allied Health Education and Accreditation of the American Medical Association ("Essentials" n.d.), many existing programs will have to undergo revision in order to attain certification.

3. Education and Training Programs:

The training may be offered as a twenty-four month integrated program with an educational institution or a one-year program in ultrasound with a prerequisite experience in a clinically related allied health profession. The institution sponsoring a program must be accredited by recognized agencies or meet comparable standards approved by the Committee on Allied Health Education and Accreditation of the American Medical Association.

A program in diagnostic medical sonography includes both clinical and classroom components. The American Society of Ultrasound Technical Specialists suggests that a program should include:

1. Orientation
2. Professional ethics
3. Anatomy and physiology
4. Pathology and clinical medicine
5. Medical terminology
6. Nursing procedures pertinent to diagnostic ultrasound
7. Biological effects of ultrasound
8. Ultrasound physics
9. Instrumentation
10. Ultrasound positioning and techniques
11. Film critique
12. Comparison and correlation of ultrasound and other diagnostic procedures
13. Equipment maintenance
14. Departmental administration

The twelfth draft of the "Essentials of an Accredited Educational Program for the Diagnostic Sonographer" is being reviewed for adoption by the Committee on Allied Health and Accreditation of the American Medical Association in cooperation with various supporting professional organizations. These essentials require a minimum of twenty-four months of post-secondary education for program accreditation.

Summary

Allied health education is composed of a number of occupational areas that are projected to experience rapid growth; a 38.42 percent change is predicted over the next decade for the category, other technologists and technicians. Accompanying this rapid growth is an increase in the number of occupations in this area. Two new and changing occupations that have curriculum development needs are the multi-competency technician and the diagnostic medical sonographer.

Occupational Safety and Health Area

Conditions Affecting the Nature and Growth of the Occupational Safety and Health Area

The goal of occupational safety and health professionals is to control occupational accidents and diseases by detecting and identifying accident producing or hazardous conditions or practices. Hazardous work conditions may involve noise, dust, vapors, faulty equipment or other hazards that are part of the industrial setting. Occupational health and safety professionals are also concerned with related property losses and consumer injuries due to unsafe products. The occupational safety and health professionals evaluate the problem, monitor noise levels, measure radioactivity levels, and implement systems to eliminate or control the problem.

According to the Bureau of Labor Statistics, Occupation-by-Industry Matrix (1978) the projected 1985 requirements for the area of occupational safety and health will be 32,500, a 29 percent growth between 1974-85. New data will be available in January 1979 when an updated edition of Occupational Projections and Training data will be released.

Occupational safety and health covers a variety of occupations and industries. Currently, the majority of professionals working in the area holds a B.A. or higher degree. Occupational titles include safety engineers, fire protection engineers, industrial hygienists, loss control and occupational health consultants, and compliance officers.

Professionals work in industrial and manufacturing firms, private laboratories or laboratories maintained by large insurance companies or industrial firms, insurance companies, and government.

Growth of this occupational area is strongly influenced by the 1970 Occupational Safety and Health Act (OSHA), union interest and concern, and rising insurance costs. This general trend in concern for occupational safety and consumer safety will foster faster-than-average growth for all of these occupations.

Opportunities for Curriculum Development in the Occupational Safety and Health Area

As part of the rapid growth of this occupational area, the position of the technician is receiving more emphasis. Although technicians have been utilized in other areas of occupational safety and health, it is only recently that the industrial hygiene technician has become a recognized occupation. The following section discusses the rapidly growing technician area in occupational safety and health, Industrial Hygiene Technician.

Industrial Hygiene Technician. The growth of the industrial hygiene technician is expected to accompany the growth of the occupational safety and health professional. Many industrial and manufacturing firms will be establishing programs; others will be expanding or upgrading existing programs. This growth is expected to occur in response to the factors listed in the above section. As a whole, the American Industrial Hygiene Association, the professional organization for industrial hygienists, predicts a "four-fold increase" in the need for hygienists in the next decade. They also indicate that the need for industrial hygiene technicians will be "very great" (1976).

1. Program Description:

The industrial hygiene technician works under the supervision of the professional level industrial hygienist. Working as a team, they would be responsible for detecting work environment conditions that would be hazardous to the worker's health. Examples would be high noise levels or dangerous radioactive levels.

Job duties may include taking samples, monitoring, and analyzing samples. A list of job duties for the occupational safety and health technician was developed by Vernon for the National Institute for Occupational Safety and Health.

2. Employment Outlook:

Public awareness of the need for greater attention to occupational safety has been heightened over the past year by a number of recent industrial tragedies, such as collapse of the cooling tower scaffolding in Charleston, West Virginia, the series of grain elevator explosions, and increased railroad mishaps. While BLS projections (1976) demonstrate a steady growth between 1974-1985, there also seems to be an evolving role for the industrial hygiene technician as demand for the industrial hygienist expands.

3. Education and Training Programs:

The American Industrial Hygiene Association has prepared a list of "Educational Opportunities in Industrial Hygiene" (1978). Thirty-one technician programs are listed; these programs are fairly well spread around the country. Two states, North Carolina and South Carolina, have three programs each. The list is included in Appendix L. Programs are for two years of post-high school specialized education. Many employers also prefer technicians who have had some work related experience.

A study conducted for the National Institute of Occupational Safety and Health addressed the topic of a suggested curriculum for the occupational health and safety technician (Wash 1975). Military contacts have also reported that personnel trained in occupational safety and health areas have been easily placed in the civilian sector.

There is often a fine line between the occupations in safety and health. A February 1978 Worklife article describes a "new occupation" of medical institution safety technician. A Cooperative Employment and Training Program (CEPT) was jointly conducted by George Washington University and Marymount College in Virginia. A twenty-eight-month training program including four four-month sessions of classroom work and three four-month sessions of on-site work was developed. The program is a response to "new safety and health regulations for medical facilities to detect, measure, report, and correct safety hazards common to medical facilities. These would include electric shock, noise, toxic gases and vapors, anesthetic waste, and bacteria diffusion. A unique aspect of the program is their effort to attract women and black participants ("Just what the doctor ordered", 1978, p. 3).

Summary

The projected 1985 requirements for occupational safety and health reflect a 29 percent growth rate over the base year 1974. This occupational area has been and will be strongly influenced by legislation, union support, and consumer interests. One of the newest technicians in this area is the industrial hygiene technician.

The industrial hygiene technician aids the occupational safety and health professional and this latter occupation has been predicted to increase considerably over the next decade. Thirty-one technician programs have been identified across the country.

Alternative Energy Areas

As traditional energy sources become more scarce at both the national and international levels, exploration of alternative energy possibilities will continue to increase. Potential uses of alternative sources such as solar energy, wind energy, and nuclear energy will lead to an increased demand for individuals with specific training in new and changing energy occupational areas.

Conditions Affecting the Nature and the Growth of Alternative Evergy Areas

Projections indicate that energy will influence many areas of employment well past the year 2000. Technology efforts in the related industries will focus on methods to conserve energy as well as on additional or alternative sources of energy.

There is not one general scenario that can be developed across all alternative energy areas. Short term, intermediate, and long term growth projections differ for the various energy related industries and are as strongly influenced by changes in federal guidelines and regulations as they are by advances in technology and the availability of the source of energy.

Just as there is not one general scenario applicable to all alternative energy areas, neither are there similar occupations across alternative energy areas. Each occupation is comprised of competencies unique to its own particular energy area.

Reliable growth projections for energy related occupations are difficult to obtain for several reasons. Most standard employment data reporting systems on both federal and state levels do not contain a special category for most energy related industries or occupations. It is necessary to rely on other types of information sources in trying to assess the growth of the industry or occupation. These other sources of information include proprietary and special studies or surveys and informed judgment. However, projections can vary if one is pro-coal mining, pro-nuclear power or pro-solar energy.

Opportunities for Curriculum Development in Alternative Energy Areas

Lessons from the past are particularly applicable to perceived needs in alternative energy areas. Quite often the popularity of a demand area has been the driving factor in developing human resources; less emphasis has been put on a continuing sensitivity to changing human resource needs. Examples where other levels of education have overresponded include the oversupply of the nuclear engineers in the mid 1950's, the aerospace engineers in the mid 1960's, and the environmental engineers in the 1970's. At the vocational/technical level, programs for nuclear technicians have faced problems, and it is possible that programs for solar energy technicians may follow suit. The topic of energy is a popular one; intended solutions to the energy problem are welcomed with open arms. It is observed that caution is advisable on two points. First, for some of the newer energy areas, such as bioconversion, much of the technology is still in the research and development stage. The total market is only beginning to be developed so the local market may be quickly saturated because of small initial needs. Second, many of the jobs related to energy areas are locally oriented, and human resource needs projected on a national level do not necessarily reflect local needs; prime examples of this are in coal mining and nuclear power.

The major occupational areas to be analyzed in the remainder of this chapter include: (1) solar energy workers; and (2) other types of energy workers, such as (a) workers in energy efficiency, (b) nuclear energy and (c) coal energy.

Solar Mechanic and Solar Technician. One of the more popular energy areas is that of solar energy, but projections as to the growth of the industry as well as projections regarding the growth of related occupations are often clouded by advocate groups trying to promote solar energy. What is solar energy? The Federal Energy Agency Task Force of 1974 defined solar energy as actually consisting of six separate energy areas, each one quite different from one another (see Table IV-2). These six areas are: (1) heating and cooling buildings, (2) solar thermal systems, and (3) wind energy systems, (4) bioconversion, (5) ocean thermal conversion, and (6) photovoltaic (Gutmanis, 1974, p. 57). Most of the existing discussion in regard to human resource requirements is focusing on the first and second areas: heating and cooling of buildings and solar thermal systems.

Table IV-2

Estimated Need for Energy Workers to the Year 2000

Energy Areas	Person-Years/10^{12} BTU/Year
Heating and Cooling of Buildings	1000 - 2000
Solar Thermal	1000
Wind Energy	250
Bioconversion	
Terrestrial	65
Marine	85
Agricultural Wastes	125
Urban Wastes	5 - 10
Ocean Thermal	120
Photovoltaic	7500

Source: Gutmanis, 1974, p. 62.

Studies have identified two promising new and changing occupations in the area of solar energy. There has been much discussion as to the reality of these occupations, and this discussion is summarized by the description of each of the occupations. The types of solar workers that have been identified are solar mechanic and solar technician.

1. Position Description:

Tables IV-3 and IV-4 lists the task requirements for two types of solar workers: the solar mechanic and the solar technician. The solar mechanic is the tradesperson, that is, plumber, heating, ventilating and airconditioning, journeyperson, electrical, sheet metal worker. This indiviudal provides about eighty percent of the solar system installation effort. Although it is true that specialized training is necessary for solar energy installation jobs, it is also true that the experienced construction worker can be trained as a solar mechanic in several months. "The untrained worker, with a relatively low-level of skill, can ...be trained relatively quickly to carry out solar installations" (California Public Policy Center 1978, p. 41).

From the list of solar mechanic tasks in Table IV-3 it seems that training or education might focus on changes in existing

Table IV-3

Predominant Solar Mechanic Tasks
(Solar Mechanic Task Requirements)

-- Install and wire solar control systems
-- Read blueprints and/or schematics
-- Cut and join plastic pipe/plumbing
-- Install solar collectors on existing roofs
-- Maintain and repair solar collector array
-- Maintain and repair solar plumbing
-- Maintain and repair solar blowers and fans
-- Cut and braze copper pipe/tubing
-- Install prefabricated sheet metal parts
-- Install solar collector array or solar furnace at ground level
-- Maintain and repair solar water pumps
-- Install water storage sub-systems
-- Install living area/space heat exchanger units
-- Build and/or install rock storage sub-systems
-- Install solar-pond or solar-wall (thermal mass) systems
-- Soft-solder electrical wires and connections
-- Install auxiliary backup heating systems
-- Modify existing furnace to accept solar apparatus
-- Cut and/or install glass or plastic glazing in collectors
-- Install movable insulation and apparatus in passive systems
-- Modify or relocate existing plumbing and exhaust vents on roof
-- Install heating ducts and vents
-- Install solar-assisted heat pumps
-- Trouble-shoot, maintain and repair solar controls
-- Silver braze copper alloy pipe and sheets
-- Cut, bend, fabricate sheet metal parts
-- Perform supervisory function
-- Cut, thread, install galvanized pipe/plumbing

Source: William D. Hunt. (See also California Public Policy Center Study, 1978, pp. 39-45).

Table IV-4

Predominant Solar Technician Tasks
(Solar Technician Task Requirements)

--Read blueprints and/or schematics
--Calculate heat loss/gain in buildings
--Size solar collector array
--Prescribe appropriate automatic solar controls
--Size water storage sub-systems
--Draft blueprints and/or schematics
--Perform supervisory functions
--Trouble-shoot, maintain and repair solar controls
--Size or prescribe solar plumbing, to include pumps, based on "rule of thumb" procedures
--Size solar-assisted heat-pump systems
--Size auxiliary backup heating systems
--Size or prescribe solar plumbing, to include pumps, based on flow rates, friction loss, and other data
--Size heat exchanger units
--Size rock storage sub-systems
--Sell solar apparatus
--Size or prescribe solar-pond or solar-wall (thermal mass) systems
--Size south-facing window systems
--Prescribe types of movable insulation and apparatus in passive systems
--Perform administrative functions
--Calculate heat loss/gain in storage systems
--Install and wire solar control systems
--Maintain and repair solar collector array
--Design duct work requirements
--Size or prescribe heating ducts, vents, and blowers based on "rule of thumb" procedures
--Size or prescribe heating ducts, vents, and blowers, based on flow rates, friction loss and other data
--Calculate heat loss/gain in plumbing and duct systems
--Maintain and repair solar plumbing

Source: William D. Hunt. (See also California Public Policy Center Study, 1978, pp. 39-45).

curriculum on both the secondary and post-secondary level. Changes on the post-secondary level would appear to take place in colleges that operate cooperative training programs with labor organizations. A curriculum to be developed might include modulison fluid pumps, circulating systems and storage units.

The solar technician provides approximately twenty percent of the solar system installation effort. The list of solar technician task shown in Table IV-4 can be grouped as involving design, installation, maintenance and repair. Again, as in the case of the solar mechanic, there is a question as to whether the technician is indeed a new occupation or whether existing tradespersons will perform the needed tasks. In either case, there are training or education implications. Under a study funded by the Illinois Office of Education, researchers concluded that "training should be directed at producing more widely-skilled workers who have more specialized solar-related knowledge in addition to competencies required for more convential occupations" (Rubenstein and Ramsey 1977, p. 60). Again, a modular approach to developing instructional materials appears to meet the need as this would facilitate adapting current curriculum to local needs. Based on identified tasks, the modules could include such items as retrofitting technology, life costing methodology, principles of solar energy systems, drafting use of micro-processors for monitoring, and heat transfer theory.

2. Employment Outlook:

A summary of various studies on estimated human resource needs in solar energy is included in Table IV-5.

The National Planning Association, under contract to the Federal Energy Administration (FEA), prepared estimates for some sixty occupational categories for energy facilities. These estimates were based on a trial FEA scenario. The report states that "any large scale use of solar energy in any form appears unlikely much before 1985" (Gutmanis 1974, p. 59).

Mitre Corporation (MITRE) conducted a study for the Sheet Metal Workers International Association of the AFL-CIO and estimated a $10 billion industry by 1985 (Fraser 1978). In human resource numbers they estimated total solar employment

Table IV-5

Comparisons of Studies for Projected Human Resource Needs in Solar Areas (by 1985)

Study	Total Solar Employment	Technician Employment*
SEIA	80,000	16,000
UNM	40,000	8,000
MITRE	25,000	5,000

*Based on estimated 20 percent of the total employment needs

Source: Doggette and Blair 1978.

by 1985 would stand at approximately 25,000; approximately twenty percent of which, or five thousand, would be in technician employment (Doggette & Blair).

The solar Energy Industry Association (SEIA) estimates there will be approximately 74,000 jobs in the industry by 1982 and 347,000 jobs in 1987 (Brown 1978). If the same estimate of approximately twenty percent of the jobs being technician jobs is used, this would give an estimate of 14,800 technician jobs in 1982 and 69,400 technician jobs in 1987.

A Navarro study (1978) compared the Solar Energy Industry Association (SEIA) projections, the MITRE projections and a University of New Mexico study. Comparisons of human resource projections are made based upon a common assumption that a minimum of 2.4 million residential solar units will be installed by 1985. The results depicted in Table IV-5 illustrate the wide range of uncertainty as to human resource projections in the solar energy field.[19]

[19]Additional studies are currently being conducted under Department of Energy ponsorship, notably, the Labor Affairs and Manpower Assessment Division, Office of Education, Business and Labor Affairs, Assistant Secretary for Intergovernmental and Institutional Relations. Preliminary information suggests that earlier estimates of the supply/demand for solar energy personnel may be overly optimistic.

Major solar job categories related to heating and cooling and solar systems can be subdivided into (1) collector manufacturing jobs, (2) component manufacturing jobs, (3) installation jobs, (4) distribution jobs, and (5) indirect/induced jobs (California Public Policy Center 1978). Those jobs of the most direct concern to vocational education are the installation related jobs. Installation jobs are those that occur on-site, as a given solar system is placed onto or into a residential or industrial structure.

Between now and 1990 the most immediate jobs in installation are those involving "(1) fitting existing residences with solar water heating, (2) equipping new residential construction with solar space and water heating, (3) retrofitting existing commercial space with solar space and water heating: building new commercial space with solar space and heating, and (4) using active solar systems for retrofit and new process heat and other industrial applications" (California Public Policy Center, 1978, p. 51).

The term "active solar system" as used in the above paragraph refers to systems that require an input of non-solar energy. These systems have mechanical pumps, heat pumps, etc. and utilize existing technology; they include both liquid and air systems.

Passive systems do not require an input of non-solar energy. An example would include use of collectors which can be covered and uncovered to make maximum use of radiant energy (Wisconsin Board of Vocational, Technical and Adult Education 1977). Another approach would be positioning a building and its windows in order to make maximum use of radiant energy.

3. Education and Training:

Construction trades such as masonry, carpentry, sheet metal, insulation, plumbing, electricity and heating, ventilating, and air conditioning (HVAC) are involved in the installation of both passive and active solar systems. Many studies and reports have concluded that at the present there do not seem to be any occupational trades involved in solar energy; existing occupations will involve additional or modified training to meet new needs. Other studies have identified two new types of solar workers - the solar mechanic and the solar technician (Hunt 1978 and Navarro College 1978).

Several curriculum development efforts have been conducted in the area of solar energy. One such effort is "Understanding Solar Energy Systems" developed by Keaton and Eddington (1977) at the Educational Research Center at Las Cruces, New Mexico. This curriculum project was based on the premise that while a two-year solar technician program was not desirable, units emphasizing the understanding of solar energy systems would be useful.

Other curricular efforts include the National Science Foundation project to develop curriculum for the solar technician and mechanic being conducted at Navarro College, Corsicana, Texas. (Navarro College 1978).

An April 1978 report of the National Solar Heating and Cooling Information Center (1978) on solar-related courses in vocational/technical schools lists seventy-five existing programs. This same report also indicates that Barron's Guide to the Two Year Colleges lists more than one hundred fifty colleges as having programs in heating and air conditioning (climate control) technology. There was no estimate made as to how many of these colleges may be including courses in solar energy principals or solar thermal conversion system maintenance. The report is included in Appendix N.

A Navarro study also suggested that initial feasible geographic positions for immediate solar energy growth were the northeast and north central states with the middle belt states becoming feasible in the near future (Doggette and Blair 1978).

Currently, solar technicians are trained in apprenticeship construction programs or on-the-job in areas including HVAC, sheet metal, plumbing, carpentry, etc. Another important source of technicians is from Comprehensive Employment and Training Act (CETA) funded programs. Future Comprehensive Employment and Training Act (CETA) funding plans include dollars for training programs for solar energy technicians. This appears to be a potential area of further cooperation for vocational education and CETA; local vocational education programs provide the training programs.

Many reports indicate that the solar energy technician occupation is particularly suitable for untrained workers with a relatively low level of skills. The untrained worker can be trained relatively quickly to carry out solar installations so these programs may be well suited for areas of high unemployment.

The Navarro study (1978) concluded that for solar energy technicians, approximately eighty schools, each graduating fifty solar technicians will be needed between now and 1985. This is based on a need for four thousand technicians between now and 1985 (Doggette and Blair 1978). It is obvious that training is taking place in many areas including CETA programs that will be graduating numbers of technicians. This is in addition to programs that already exist at vocational and technical levels.

Energy Efficiency. As with the occupations of solar energy mechanic and solar energy technician, the question is: Will energy conservation result in a new and changing occupation or is it instead a set of skills that should be included as part of training programs for already established occupations? So far there has been very low demand from industry for an individual trained as an energy efficiency technician. Industries at the present time are assigning weatherization or energy conservation tasks to existing personnel.

The first energy-related projects supported by the federal government were joint undertakings involving Comprehensive Employment Training Act (CETA) programs administered by the Employment and Training Administration (ETA), the Community Services Administration, and a variety of state and local governments, nonprofit organizations, businesses, and individuals to winterize (or weatherize) the homes of poor and elderly families. The original goals were to keep poor people from freezing, to reduce their fuel bills, and to provide work and job training for the disadvantaged unemployed (Fiester 1977). Currently these seem to be the only groups that recognize energy conservation as an occupational category.

Because training to conduct energy audits or to weatherize does not involve extensive training, this area is also a focus of CETA training. Again, this continues to be a potential area of cooperation between vocational education and CETA. Current training in this area focuses on those wanting to become entry level workers and those who want energy conservation skills to complement their major skill area. This is true of a construction worker or an HVAC worker.

Possible types of information to be included in modules include: laws, regulations and codes, use of micro processors for monitoring energy systems, instrumentation and monitoring systems, technical assistance to small business and commercial establishments for energy use and conservation.

Funding for the development of training has come from a variety of sources including CETA and the U.S. Office of Education. An example of local effort is a $126,000 contract by the Governor's Office of Energy Studies and the Department of Mechanical Engineering to train home energy auditors. The thirty-six hour course is aimed at those already in the home building industry (Mechanical Engineering 1978).

Nuclear Energy. Original projections for massive growth in this industry have been revised downward. Licensing procedures, costs, and other restrictions have increased the time between the planning and the actual operation of a plant to approximately ten years. It is also anticipated that nuclear energy technology in uranium mining, fuel processing, fuel fabrication, and nuclear plants will not undergo any noticeable change in the next ten years.

Most community colleges that initiated training programs for nuclear energy technicians did so in order to respond to anticipated local needs of the proposed construction of power plants. Several problems have arisen. First, as mentioned above, construction time for the plants has increased from a scheduled four years up to ten years, thus completely negating any past human resource planning. Second, the training provided did not meet the needs of the utilities, namely, to have operators that could pass the Nuclear Regulatory Commission's licensing examination. Third, training as a nuclear technician did not assure a favorable job position versus an unskilled worker (Doggette and Blair 1978). Of the seventeen technical schools and colleges with known nuclear programs, two have recently closed their programs (see Appendix O for listing of identified programs). The more successful schools have developed a strong working relationship with the local nuclear-related companies and are training to meet local needs.

The U.S. Office of Education has funded curriculum development efforts at the technician level in nuclear energy curriculum. Extensive development has been done by the Technical Education Research Center (TERC) in Texas.

There are currently sixty-eight nuclear power units in the United States with an additional one hundred forty four units under construction or in various stages of planning (Mechanical Engineering 1978). Because of the small percentage of nuclear association degree technicians employed in industry, a wide-spread effort to develop nuclear technician programs does not seem to be cost effective (Doggette and Blair 1978). Any school, anticipating becoming involved in training for nuclear technology, needs to have assurances of support and involvement from local industries.

Coal Mining. An important part of the current energy plan is a shift toward the burning of coal; therefore, the employment requirements for the projected needs in coal have been the subject of several studies. Projections for the demand for coal miners are based on the number of tons of coal mined per year, productivity per worker, and the number of attritions.

- President Carter has called for an increased output to 1.2 billion tons of coal in 1985.

- The Bureau of Mines estimates 1,000 million tons to be produced in 1985.

Productivity, measured in tons of coal per worker per shift, had steadily increased from 1950 to 1969, but since 1969 has started to and has continued to decline. Several factors have been hypothesized as affecting productivity.

These include regional variations in characteristics of production, mix of underground/surface mining, turnover/absenteeism, strikes/slowdowns, a younger, less skilled workforce, and especially the Coal Mine Health and Safety Act of 1969 and the union agreement of 1974, that assigned assistants to certain occupations thereby increasing labor costs but not necessarily productivity. The Coal Mine Health and Safety Act of 1969 affected productivity by: (1) requiring an increase in safety personnel at mines which has increased labor costs, but not productivity; (2) mandating that certain safety provisions be instituted in mines which requirements have resulted in a slow-down in productivity; and (3) providing the blacklung retirement provision which has resulted in a younger, less experienced coal mining workforce (Baker 1978).

- The Project Independence scenario indicates an increase in productivity to an average of 24 tons per person per shift in 1985.

- The report by Kramer indicates an increase in productivity by 1985 to 41.4 tons for surface coal and 11.5 tons for underground coal for a computed total productivity of 18 tons.

- The Kramer productivity estimates combined with the Project Independence surface/underground compute out to a productivity of 30 tons.

The above projections for output and productivity have been charted on Table IV-6 to show the wide range of employment projections for the year 1985. Compared to an actual March 1987 workforce of 193,380, the growth rates for the projected employment requirements range from negative to positive growth from 1978 to 1985.

Table IV-6

Projected Employment Requirements for Three Projected Outlook Levels, 1985[a]

Productivity (Tons/Shift)	$1,000 \times 10^6$ Tons[b]	$1,100 \times 10^6$ Tons[c]	$1,230 \times 10^6$ Tons[d]
30 (Kramer)	138,000	152,800	170,800
24 (Project Independence)	173,600	191,000	213,500
18 (Kramer)	231,400	254,600	284,700
13.6 (1976 level)	306,300	337,000	376,800
8.3 (1969-76 level)	502,000	552,200	617,500

a Assuming 240 shifts per miner per year
b Bureau of Mines Report
c Kramer Study estimate
d President Carter's goal

Source: J.G. Baker, 1978, p. 6.

This increased production and/or productivity will be accomplished through changes in technology, increasing individual miner productivity, and hiring additional miners. According to one calculation:

> For 1 billion tons...mined in 1985, if production per person remains at 13 to 15 tons per day for both surface and underground mining, and if the annual exit rate...remains similar to the present rate, approximately 100,000 new jobs will exist. Roughly 40,000 to 45,000 new hires per year will be needed to meet a demand of 3,000,000 miners in 1985 (Doggette and Crowell 1978).

The employment opportunities will be localized; that is, employment will be concentrated in certain geographical regions and will be focused on the individual mines.

Legislation has mandated certain training for coal mining. The Coal Mine Health and Safety Act of 1969 (CMHSA) was one of the first pieces of legislation. The Federal Mine Safety and Health Act of 1977 mandates that new underground miners will receive forty hours of training and surface miners will receive twenty-four hours of training. Experienced workers are required to receive eight hours of training each year under the Act. The U.S. Mining Enforcement and Safety Administration's (MESA) mandatory safety standards provide part of the foundation of the identified required skills for coal miners.

The bargaining agreements between the coal mining industry and the United Mine Workers of America have also reflected this recognition of the need for training. New hires are to receive initial training and experienced miners are to receive one day of retraining annually.

Educational institutions can fill needs by providing entry-level training and short course upgrading training. Annual safety and health training and certification preparation will also continue to be needs that educational institutions can help meet. Therefore, four areas are identified as foci for training. These four areas are safety, maintenance, supervisory, and entry level skills. A summary of the existing occupations in surface and underground mining is included in Appendix P.

Safety training needs are identified in legislation and work agreements. Further details are delineated in the accompanying regulations. In addition to specific safety training for each job an additional area of concern is emergency medical training. A deep interest has been expressed in training for cardiopulmonary resuscitation and training emergency medical technician I (Jones 1978).

Equipment maintenance covers all areas of mining and focuses on a knowledge of electronics and hydraulics. Training for maintenance of equipment should ideally require a cooperative on-site situation since mining machinery is not only bulky, but expensive. For instance, a machine known as a continuous miner can be about thirty-four feet long by eleven feet wide and weigh from 50,000 to 100,000 pounds. This machine may cost from two hundred fifty to three hundred thousand dollars.

Supervisors must be certified according to state law; this includes both the section foreman and the mine foreman. The mine foreman would be the focus of most supervisory programs since

that is the top if the career ladder: miner trainee, miners' machine operator, fireboss, section foreman, and mine foreman (Jones 1977). The curriculum places a heavy emphasis on safety procedures and the basic mechanical systems. Supervisors must also be knowledgeable about state and federal regulations. A program that focuses on training supervisors is located at Pikeville College, Kentucky. The college has calculated that through retirements, one thousand supervisory people nationwide exit the coal industry each year (Jones 1976).

Entry level training should also emphasize safety. Current training is a minimum of four days as specified in the current UMWA contract; programs may run much longer. An example of a more extensive program is one conducted by the Adult Education Division of Belmont County, Ohio Joint Vocational School. This is a five week program that involves the use of a simulated mine with actual equipment (Jones 1976).

It has been difficult for vocational-technical schools and community colleges to become involved in training for the mine industry. Training needs vary from mine to mine so local support must be developed and maintained for each training program. Also, mining is regulated not only by federal regulations and the United Mine Workers Association (UMWA) contract, but it is also regulated in each state by its own mining laws. This binds the how, when, and where of each operation with legal mandates. Since educational institutions must also have the respect of the miners, it is suggested that instructors have actual mining experience and keep up to date in new techniques and regulations. Schools may also need to take their training on-site for all shifts, especially to provide the experienced miner's training.

Educational institutions have only recently begun to offer training programs in coal mining. Of the thirty-three programs that have been identified in vocational/technical schools and colleges, only four were established before 1972 (Doggette and Crowell 1978). Approximately twenty of these programs are in community colleges. A list of programs as of 1976 is included in Appendix Q.

A majority of the existing training programs are underground mining training programs and are located east of the Mississippi. This indicates a need for programs to support training needs of coal mining west of the Mississippi. This is usually surface mining. Training for surface equipment operators and support personnel are potential areas for growth in the western portion of the United States (Doggette and Crowell 1978).

A recent national conference that focused on training in the coal industry, as well as other energy areas, reported that coal mining instructional materials are not plentiful. Companies are usually proprietary with their developed materials and among post-secondary institutions little sharing has taken place (Doggette 1976). Participants suggested that federal funding could best be used to assist cooperative efforts among education institutions. "Development and exchange of instructional material, opportunities for instructor upgrading, equipment acquisition, and start-up funding in under-populated areas are primary needs " (Doggette, 1976, p. 11).

There are several curriculum development efforts currently under way under the sponsorship of the U.S. Office of Education (USOE) and of the Department of Labor (DOL). DOL has funded, under Title I, five proposals in DOL Region VIII to train entry level or support personnel. All proposals were based on local critical demand. Table IV-7 summarizes the areas of training; in most cases training will be aided by local community colleges.

Table IV-7

Current Coal Mining Related Training Efforts Funded by DOL in Region VIII.

State	Training Area
Colorado	. diesel mechanics mine electricians
Wyoming	. heavy equipment operators, maintenance personnel
North Dakota	. heavy equipment operators, machinery, mechanics, industrial electrical technicians, and mine trainees
Montana	. diesel mechanics
South Dakota	. coal train repair persons

Source: Doggette and Blair, 1978.

A unique training program has been funded under a demonstration grant of CETA, Title III to the Illinois Basin Coal Manpower Council. Migrant and seasonal farmworkers, including women and minorities, will be recruited to the mine-related training effort. Wabash Valley College will aid the training effort (Doggette and Blair 1978). This type of program is similar internally to the Coal Employment Project which is financed through foundation grants and other efforts to support efforts to bring more women into the coal mining industry.

Summary

Projections indicate that energy will influence many areas of employment well past the year 2000. Because of the many factors influencing each alternative energy area, it was not possible to develop one general scenario across all areas. For the newer energy areas such as bioconversion much of the technology is still in the research and development stage and there is little current influence from this area on occupations. Many of the jobs related to energy occupational areas are locally oriented and human resource needs projected on a national level do not necessarily reflect local needs.

In solar energy employment projections vary widely, but there is general agreement that the industry of solar energy will influence existing occupations to a greater extent than they will create new occupations. Two new groupings of skills associated with solar energy installation have resulted in some experts' identifying new occupations of solar mechanic and solar technician. Much training currently takes place through CETA programs.

Tax incentives in the new energy legislation should add a stimulus to energy conservation-related activities. At the present time, it does not seem likely that a new occupation of energy efficiency technician will be demanded in large numbers. It is more likely that there will be a need for modules related to energy conservation that can be incorporated in existing curricula. Short term training programs through CETA are projected to receive continued funding.

Original projections for massive growth in the nuclear energy area have been revised downward. Most existing education programs have been developed to meet local needs. There does not seem to be a need to support additional curriculum development for nuclear technicians.

Several types of instructional needs were identified for the coal energy area. First, more training programs are needed to meet the shift to surface mining in the western part of the country. Second, program needs for coal mining must be locally oriented, and developed with the support and cooperation of the local coal industry. Third, while some adequate curricula exist, schools either do not know how to gain access to them,or they are not sharing them. Fourth, start-up funding is needed for program development in under-populated areas. And finally, there is need for continued efforts to attract more women in the field of coal energy.

References

Other Allied Health Needs References

Allied Health Education. JAMA, Volume 238, Number 26, December 26, 1977, 2809 - 2824.

American Medical Association. Allied Health Education Directory 7th Edition. Monroe, Wisconsin: American Medical Association, 1978.

American Society of Ultrasound Technical Specialists (ASUTS). Creeer Information/Diagnositc Medical Ultrasound. Mobile, AL: ASUTS, October, 1978.

American Society of Ultrasound Technical Specialists (ASUTS). Educational Centers Throughout the United States and Canada. Mobile, AL: ASUTS, n.d.

Bureau of Labor Statistics, U.S. Department of Labor. Occupation-by-Industry Matrix. (unpublished 1978)

Bureau of Health Manpower/Division of Associated Health Professions, U.S. Department of Health, Education and Welfare. Allied Health Education Programs in Junior and Senior Colleges: Health Planners Edition. Hyattsville, MD: U.S. Department of Health, Education, and Welfare, 1975.

Council on Postsecondary Accreditation. "Statement on Proliferation In Accreditation." Adopted by The Council on Postsecondary Accreditation Board, October 13, 1977.

"Educational Opportunity for Mid-Career Adults." Allied Health Education Newsletter, Number 113, October, 1978. p. 3.

"Essentials of an Accredited Educational Program for the Diagnostic Medical Sonographer." Draft 12A. American Medical Association, Council on Medical Education, n.d.

Heath, W. "Multi-Competency Technician." Personal Correspondence, 1978.

Perry, J.W. "Professional Interrelationships in Health Care in the '80's: Potentials for Conflict, Opportunities for Collaboration." Keynote Address at the 1977 Annual Professional Conference of the Allied Health Association of New York State. Sheraton Airport Inn, Albany, New York, October 28, 1977.

"The Results of the Economic Status Survey." Mobile, Alabama: American Society of Ultrasound Technical Specialist, October 1978.

University of Alabama in Burmingham. Self-Evaluation Report: Medical Assistant/Multiple Competency Clinical Technician Program. Submitted to the Curriculum Review Board of the Committee on Allied Health and Accreditation of the American Medical Association, 1978.

University of Alabama in Burmingham. The Many Faces of the Multiple Competency Clinical Technician: Program Brochure. Burmingham, Alabama: The University of Alabama at Birmingham, School of Public and Allied Health, 1977.

Wash, P. "Occupational Safety and Health Professional." Occupational Outlook Quarterly, Volume 19, Number 1, Spring 1975, p. 32-34.

Occupational Safety and Health References

American Industrial Hygiene Association (AIHA). Industrial Hygiene/The Key to Occupational Health. Akron, Ohio: AIHA, 1976.

American Industrial Hygiene Association (AIHA). Join the World-Wide Organization for Professionals in Occupational Safety and Health. Akron, OHio: AIHA, 1978.

American Industrial Hygiene Association (AIHA). Educational Opportunities in Industrial Hygiene. Akron, Ohio: AIHA, n.d.

Bureau of Labor Statistics, U.S. Department of Labor. Occupational Projections and Training Data. Bulletin 1918. Washington, D.C.: Government Printing Office, 1976.

"Just What the Doctor Ordered." Worklife, February 1978, p. 3-7.

National Health Council. 200 Ways to Put Your Talent to Work in the Health Field. New York, New York: National Health Council, n.d.

Meleen, P. et al. Identifying and Planning for New and Emerging Occupations: A Suggested Guide. Belmont, MA: Contract Research Corporation, 1976.

Alternative Energy Areas References

Ansell, S.D. "Energy and Occupational Education." The Wisconsin Vocational Educator. March 1978, 7-9.

Baker, Joe G. Coal Mine Labor Productivity: The Problem, Policy Implications and Literature Review. Research Memorandum. Oak Ridge, Tennessee: Oak Ridge Associated Universities, April 1978.

Boylan, M. "Employment Growing in Nuclear Energy Industry." Occupational Outlook Quarterly. Fall 1977, 30-31.

Brooking, W.J. "Energy Related Technology Program to Help Meet the Nation's Needs." Technical Education Yearbook, 1977-1978. Ann Arbor, Michigan: Prakken Publications, Inc., 1977.

Brown, S. "CETA Shines in California Sun Power." Worklife. April 1978, 19-21.

California Public Policy Center Study. Jobs From the Sun: Employment Development in the California Solar Energy Industry. Los Angeles, California: California Public Policy Center, 1978.

Cohn, E. et al. The Bituminous Coal Industry: A Forecast. University Park, Pennsylvania: Institute for Research on Human Resources, 1975.

Doggette, J.R. Energy-Related Technology Programs in Community and Junior Colleges: An Analysis of Existing and Planned Programs. Springfield, VA: National Technical Information Service, 1976. (ERIC Document Reproduction Service No. ED 125 703)

Doggette, J.R. and Blair, L.M. Emerging Technician Occupations in the Energy Field. To be published 1978.

Doggette, J. and Crowell, M. Implications for Energy-Related Technologies in Vocational-Technical Education: An Analysis of Recent Projects and Research. Oak Ridge Associated Universities, October 30, 1978.

Edington, E. et al. Policies and Manpower Needs to Emerging Energy Sources in Arizona and New Mexico. Las Cruces, New Mexico: Educational Research Center, 1977.

Fiester, K. "Energy War is Generating Jobs." Worklife. October 1977, 14-20.

Fraser, D. "Sun Day." Worklife. April 1978, 15-17.

Gilmore, C.P. "Higher Efficiency with Solar-Assisted Heat Pumps." Popular Science. May 1978, 86-90.

Gutmanis, I. et al. Study Of Manpower Requirements By Occupation For Alternative Technologies In The Energy-Related Industries, United States, 1970 to 1990. Washington, D.C.: The National Planning Association, 1974.

"Home Energy Auditors." Mechanical Engineering. June 1978, 18.

Hunt, William D. "Solar Technicians and Mechanics: A Preliminary Occupational Task Analysis". Chico, CA: California State University, n.d.

Jones, H.M. Mining Technology: An Assessment Study for Educational Institutions Involvement in Servicing the Mining Industry. Westmoreland Community College, 1976.

Keaton, Laurie and Edington, Everett D. Solar Energy Instructional Module: Understanding Solar Enegy Systems. Las Cruces, New Mexico: Educational Research Center, New Mexico State University, 1977.

McCallion, T. "Solar Energy: Potential Powerhouse for Jobs." Worklife. August 1976, 3-6.

Mechanical Engineering. "Energyscope: The Uranium Enrichment Business." Mechanical Engineering. May, 1978, 20-21.

Meleen, P. S.; Gordon, A. K,; Livesay, S.; Donovan, J.; Shuchat, J.; and Bloom, S. Planning for Vocational Education: New and Emerging Occupations. Belmont, Massachusetts, Contract Research Corporation, 1976.

National Solar Heating and Cooling Information Center. "Vocational/Technical Schools/Courses Solar-Related." Rockville, MD: National Solar Heating and Cooling Information Center, April 1978.

Navarro College. Assessment of Need for Developing and Implementing Technical and Skilled Worker Training for the Solar Energy Industry. Corsicana, TX: Navarro College, 1978.

Rubenstein, S.A. and Ramsay, J.G. The Advent of Solar Energy: Implications for Vocational Education in Illinois. Amherst, MA: National Evaluation Systems, Inc., 1977.

U.S. House of Representatives. Hearings on House Resolution 19 and Related Bills to Amend the Vocational Education Act of 1963. Volume 3, p. 703-720.

U.S. Energy Research and Development Administration. Energy Technology Training Conference Proceedings, 1976. CONF - 761066. Washington, D.C.: U.S. Energy Research and Development Administration, 1976.

Wisconsin Board of Vocational, Technical and Adult Education. Proceedings of the VTAE Leadership Conference on Energy Use and Occupational Impacts. Madison, Wisconsin. February 15-16 1977.

Ziegler, P.M. "Solar Technician Program Blows Hot." Worklife. October 1977, 21-24.

CHAPTER V: GENERAL SUMMARY

This study was designed to develop and provide information that will assist national vocational education planners and policy makers in selecting national priorities for curriculum development in specific occupational areas that are changing or new. New and changing occupational areas are those characterized by growth in employment during the past decade caused by: the creation of new industries or occupations; the significant restructuring of existing occupations; and modification of required skills in existing occupations. Information in this report is divided into two parts: Part One defines the problem and explains the research methodology implemented; and Part Two presents the findings of the study.

Part One is divided into two chapters. Chapter I describes the problem and discusses three difficulties in determining the needs for curriculum development in new and changing occupational areas. First, the traditional steps used in vocational education curriculum development are not easily followed in developing curricula for new and changing areas. Second, shifting occupational patterns and trends make it difficult to adapt existing vocational programs to new and changing occupations. And third, standard occupational information sources proved inadequate for identifying nationally significant occupational areas that are new or changing.

Chapter II described the three step process used to identify national needs for curriculum development. First new and changing occupational areas were identified. Second, promising occupational areas were assessed in terms of whether they fell within the scope of vocational education. And third, a review of existing curriculum sources was conducted to determine whether there was curriculum material available for the identified occupational areas. For the purposes of this project a curriculum development need was defined as a new and changing occupational area that:

1. exhibits high employment growth on a national level;

2. requires skilled or technical training of at least six months of vocational education instruction but less than a four-year college program; and

3. possesses few, if any, vocational education curricula for preparing students to enter the occupational area or occupation.

Three basic investigatory approaches were employed to identify and select new and changing occupational areas at the national level that fall within the scope of vocational education: (1) identification and examination of existing national occupational data bases and employment forecasts; (2) location and review of occupationally relevant information sources; and (3) analysis, in a working conference of experts, of employment opportunities for identified new and changing occupational areas.

The working conference also identified curriculum development needs for a selected high priority occupational area, provided the project with a significant fund of resources, and offered a unique opportunity for leadership. A four member panel on health planning strongly recommended that the occupational area of long term health care be selected for intensive analysis by a task force to be convened. The seventeen member task force, representing all levels of government, a variety of public and private agencies, and the key professional associations, assembled for a working meeting, and analyzed two long term health care settings in depth: institutional care and in-home care.

The search for curricula that would satisfy the instructional needs of the promising occupational areas, required a labor-intensive, flexible, and multi-faceted approach. Resources such as the ERIC Clearinghouse on Adult, Career and Vocational Education file on curriculum developed by federal fundings since 1970, and the National Network for Curriculum Coordination in Vocational and Technical Education were utilized. Identification of curricula pertinent to the new areas was difficult because of a shortage of information about such important matters as the tasks and knowledges to be learned.

Part Two (Chapters III and IV) reported findings for four occupational areas (long term health care, other allied health, occupational safety and health, and alternative energy). These areas were chosen, and others excluded, in accordance with the following criteria. Compliance with one or more of the criteria was necessary to develop the necessary occupationally relevant information:

1. existence of sufficient information on employment growth trends on a national level;

2. presence of substantial prior activity and knowledge, such as federal studies, congressional testimony, organizational or agency analyses, and major conferences; and

3. availability of nationally recognized authorities and agency representatives who could be assembled to provide testimony and evidence.

Information for each selected occupational area included a critical analysis of available demographic, social, economic and political factors that are expected to influence the identified occupational areas. Given the relatively high level of uncertainty in employment forecasts for occupational areas that are new and changing, this description of the broad context within which the occupational areas are developing was considered important for more confident decision making.

The findings presented in Part Two reflect the two levels of information that were available to project staff for preparing the report. More complete information is presented for long term health care (Chapter III) because the special task force provided much supplemental information about long term health care employment opportunities and curriculum development needs. The group also generated additional occupationally relevant data that allowed for a more comprehensive treatment of two settings, institutional long term health care and in-home long term health care. The findings reported in Chapter IV for the other allied health, occupational safety and health, and alternative energy areas are representative of the types and quality of information that could be assembled relying only on a secondary analysis of existing occupational information and curriculum sources.

Curriculum development needs in vocational education are identified for four occupational areas, including ten occupations that qualify as new and changing:

- Long Term Health Care:
  - o Long Term Care Technician
  - o Therapeutic Recreation Leader
  - o Nursing Home Administrator
  - o Homemaker Home Health Aide
  - o Supplementary Services Assisting

- Other Allied Health Areas:
  - o Multi-Competency Technician
  - o Diagnostic Medical Sonographer

- Occupational Safety and Health:
  - o Industrial Hygiene Technician

- Alternative Energy:
  - o Solar Mechanic [20]
  - o Solar Technician [20]

---

20 These two occupations, Solar Mechanic and Solar Technician, have been included even though there is considerable debate surrounding projected employment demand and curriculum development needs for technician level personnel in all types of solar energy. A major unresolved issue concerns whether existing personnel in the building trades should and can be retrained to perform needed tasks or whether the demand for solar workers and the requisite skill levels require a separate occupational specialty.

Position descriptions, employment outlooks, and existing education and training programs, were provided wherever the essential information could be developed.

Three summary comments relating to the research procedures and methods used are warranted based on the initial year's experience.

First, an intensive investigation of existing occupational data systems has demonstrated the inadequacy of these sources for identifying high demand occupational areas that are new or changing. The Occupational Employment Statistics (OES) employer survey was the only source for the kind of occupational information that a nationally oriented study of new and changing occupational areas requires. However, the OES data would have been more useful if "new and changing" occupations had been identified by employers to distinguish them from other, miscellaneous occupations which were given new titles for administrative reasons. Thus, the OES program offers the potential for generating state and national lists of high demand, new and changing occupational areas and occupations. Perhaps, the National Occupational Information Coordinating Committee, in concert with the State Occupational Information Coordinating Committees, can devise means for developing the necessary data.

Second, some modification in the initial year's data collection techniques are needed to ensure comparable information for all new and changing occupational areas. One technique suggested by the project's consultant review panel is "peer-to-peer" telephone exchanges with authorities, agencies, and organizations associated with identified promising occupational areas. Telephone contacts and verifications with a limited number of key sources, perhaps six per candidate, could be a powerful means for assembling and assessing information about promising new and changing occupational areas.

Third, the Bureau of Occupational and Adult Education might wish to consider continuing, in some form, the task force on long term health care (see Appendix B-3) to explore employment demands and curriculum development needs for new and changing technician level personnel in additional health settings, such as the emerging area of hospice care.

Plans for Next Year

At the time of this writing, proposed plans for continuing work are under review. Several characteristics of those plans indicate the direction and nature of the continuing work which has been recommended.

Having completed the early development work and having constructed efficient research procedures, this project will be able to consolidate prior efforts and proceed more efficiently in the future. It will be possible to concentrate more effort on analysis and less on the mechanics of data collection. In addition, work for the second year will require less effort in liaison and acquisition activities because The National Center's Clearinghouse Function will be undertaking a more active and aggressive acquisition program with respect to civilian curriculum materials.

Surveillance of the allied health, occupational safety and health, and alternative energy areas will be maintained as these areas show every indication of remaining vital and growing. Attention also will be focused on other promising occupational areas that demonstrate high demand employment opportunities. For example, the microprocessing field which has a strong potential for influencing existing technical occupations will be monitored more closely in year two.

The two-stage working conference again will be used to analyze employment demands and curriculum development needs for a promising high demand, new and changing occupational area. For example, convening a planning panel and a task force in the occupational safety and health area, which would build upon our first year's analyses of the Industrial Hygiene Technician, will be considered. This would offer an opportunity to investigate more intensively how this area overlaps with the very popular Industrial Health occupational area. That is, how different are the types of training found in these two occupational areas? Do they share any common competencies that would allow for cooperative development of curriculum modules of instruction? The selection of the occupational area to be intensively analyzed next year will be based upon assembled information available to project staff by the middle of year two.

APPENDICES

APPENDIX A

STATE APPROACHES FOR IDENTIFYING CURRICULUM DEVELOPMENT NEEDS IN VOCATIONAL EDUCATION

		Page
A-1	Overview of Five State Approaches for Identifying Curriculum Development Needs in Vocational Education	118
A-2	Identifying Vocational Education Occupational Training Needs in Florida	120
A-3	Current and Future Employment Opportunities in New and Emerging Occupations within Illinois	123
A-4	The Iowa Career Education Needs Information System	129
A-5	Occupational Program Planning in Oklahoma	134
A-6	Educational Forecasting or Job Opportunities Forecasting in the State of Washington	138

APPENDIX A-1

Overview of Five State Approaches for Identifying Curriculum Development Needs in Vocational Education

Introduction

In order to examine state level methodologies for assessing instructional needs in vocational education, representatives from five states were asked to describe the process within their own state. The states chosen for inclusion were: Florida, Illinois, Iowa, Oklahoma, and Washington. The information analyzed concerned: (1) the primary purpose for the instructional needs assessment; (2) the means for determining which occupational and curricular programs to study; (3) the steps taken to measure need; and (4) the changes or weaknesses which need correcting in the process.

More complete descriptions of how these five states approach identifying curriculum development needs in vocational education is provided in Appendices A-2 through A-6.

Synopsis

The range of ways of assessing instructional needs in vocational education at the state level varies from statistical comparisons of supply and demand for workers in traditional occupations to extensive research of emerging occupations with task analysis and educational requirement components. This variation implies a different utility for the data which are generated.

The State Board of Education of Illinois conducted their study of emerging occupations in order to correct the problem of "vocational programs which fail to reflect the demand for new and emerging occupations" (see Appendix A-3). In most of the states however, vocational planning deals with occupational growth or replacement needs in more traditional areas. This emphasis is the more practical place to start when analyzing instructional and curriculum development needs.

In Oklahoma, the primary focus of the vocational education planning process "is to enumerate current data on manpower supply and demand for selected occupations." The means utilized to achieve these ends are based upon a survey of employers regarding current numbers of persons employed (see Appendix A-5).

Vocational educators in Florida also make use of this format for estimating business-industry demand for workers (see Appendix A-2). The survey used in both states is a part of the joint federal-state Occupational Employment Statistics (OES) program which operates in a number of states (42) throughout the country.

The data base for the Job Opportunities Forecasting (JOF) in the state of Washington includes the 1970 Census tallies and updates from the Bureau of Labor Statistics. The primary goal of this forecast is to supply "information on the number of persons needed by business, industry, or the professions in any specific job category." The information is then cross-matrixed with vocational educational offerings in the state and ultimately provides input to the state legislature for decision making regarding the bi-annual budget (see Appendix A-6).

In Iowa, a survey of employers is one of four data components for the Career Education Needs Information System (CENIS). In addition, an indicator of eleventh and twelfth grade students' interests in occupations is obtained through polling. A follow-up of graduates of vocational programs also provides information to CENIS. The fourth component is the analysis of supply data, that is, the numbers of newly appropriately trained persons who can be employed for a specific job. This data is collected from employers (who may be conducting in-service education), CETA Prime Sponsors, private schools, and public career education programs (see Appendix A-4).

The five state overviews presented in Appendices A-2 through A-6 illustrate the diverseness with which individual states can and do approach these program planning responsibilities. They also highlight a major difference between national, as represented by this project, and state approaches for identifying employment opportunities and curriculum development needs in vocational education. Because of realistic parameters, such as restricted geographic area and the limited numbers of employers of a certain size, state and local planners are able to gather key planning information; for example, how many industries in a state will hire a person with a certain type of training? This type of data acquisition is simply not possible on a national level. Moreover, state and local planners are also able to conduct extensive surveys, such as canvassing every major employer with 100 or more employees. Clearly, this is not an option that is feasible or cost effective as a strategy for collecting information for national planning.

APPENDIX A-2

Identifying Vocational Education Occupational Training Needs in Florida*

Organization of Vocational Education in Florida

Three divisions of the Florida Department of Education share responsibility for vocational education in the state. The Division of Community Colleges and the Division of Public Schools (grades K-12 and adult) act as the actual service providers, while the Division of Vocational Education has the primary administrative responsibility for vocational education. In Florida, federal funds account for only about ten percent of the money spent on vocational education.

Each of the sixty-seven counties in the state serves as a school district. To provide some degree of coordination among the various school districts in a geographical area, school districts have been grouped into twenty-eight coordinating council regions. The twenty-eight coordinating councils, made up of the affected school districts, meet regularly to coordinate program offerings within the region.

Florida operates twenty-eight community colleges, one for each of the coordinating council regions. Fourteen of the community colleges operate a separate Department of Vocational Education which serves as the designated Area Vocational Education School. Twenty-eight other Area Vocational-Technical Centers also exist which are operated by the District School Boards.

The Division of Community Colleges asks that a technical review process be followed before a new program is offered at a community college. The technical review process consists of a series of questions designed to make it evident whether or not a new program is desirable. Comments on the review are made by both the Division of Community Colleges and the Division of Vocational Education. For those schools operated by the school districts, the Division of Vocational Education has prepared a guide that school districts may use to help them in their planning process. The Division also offers planning and other types of assistance to school districts desiring help.

---

*This report was prepared by Mr. Tim Campbell, Division of Vocational Education, Florida Department of Educatien.

Procedures for Determining Occupational Training Needs

Florida has participated in the joint federal-state Occupational Employment Statistics (OES) program for several years. During this time, three different sets of industry/occupational employment projections have been made using census industry/occupational employment coefficients. A fourth set of projections, based upon OES survey data, is in process and will be finished in a few weeks. The OES program provides information about the number of persons needed in each occupation and/or industry due to expansion and replacement needs. Industry/occupational employment projections have been made for the state, ten sub-state planning regions, and fourteen of the major Standard Metropolitan Statistical Areas (SMSA's) in the state. When it has been necessary for planning purposes, the Division of Vocational Education has allocated projections for a given region to the various school districts or counties making up the area by using employment data. Such information is not considered to be statistically accurate, but can be useful to help determine how many persons of each occupation the different school districts should train.

Data about the number of persons needed for different occupations is not all that is needed for the planning process. It is important to also know the supply of persons available for the different occupations. Possible sources of occupational supply outside the public schools include unemployed im-migrants, private school students, ex-military personnel, and those receiving on-the-job training. Without knowing the potential supply of trained individuals from these other sources, occupational employment needs data have to be interpreted carefully.

Using surveys, information about the number of persons completing occupational training by occupation has been collected from private schools. Analysis of the data from two different years reveals possible inconsistencies in the data. Presently the Division of Vocational Education is attempting to collect occupational completion data from state licensing data. Another attempt has been made to determine the occupation of the unemployed by using unemployment insurance data. Until more occupational data are collected and coded into the unemployment insurance system, only a very limited amount of data about the insured unemployed will be available. Florida receives a large number of in-migrants from other states. Studies have shown that a large number of these persons are working and thus provide an important source of occupational supply. Presently, there

appears to be no way to obtain sub-state occupational migration information.

To meet federal requirements, Florida follows up all completors of vocational occupational preparation programs each year. Former students are followed up in February after their completion during the previous school year ending in June. Presently, no follow-up of the non-respondents is done so it is impossible to expand the available follow-up data to the universe in a satisfactory manner. The number of respondents from the follow-up survey for a given program at a given school is often too small to be statistically reliable. However, follow-up data does provide good information about programs already in operation.

Data from the follow-up survey are used in addition to industry/occupational employment projections to help determine the need for new programs as well as the level at which existing programs should be operated. Occupational/industry employment projections often do not include information about new and emerging occupations because they did not exist at the time of the 1970 census. Not enough occupational detail is available for other occupational training programs from the projections. It is hoped, with the soon to be released OES survey-based projections, some of these problems will be cleared up.

APPENDIX A-3

Current and Future Employment Opportunities in New and Emerging Occupations Within Illinois*

In the past ten to twenty years, rapid changes in technology, changes in the social system and an emphasis on the environment have had a drastic impact on the occupational structure in this country. The resultant emergence of new occupations has had a two-fold effect on the vocational planning process:

- o Educators have experienced difficulty in keeping abreast of changing labor market characteristics, and as a result,
- o Vocational programs often fail to reflect the demand for new and emerging occupations.

This problem has not gone unrecognized; rather, the need for information on changing employment requirements to use in program planning has been acknowledged by the Vocational Amendments of 1968 and reiterated in the Education Amendments of 1976. However, traditional curriculum development procedures are not easily followed in the case of new and emerging occupational areas. Occupational functions are often hazily defined during the process of evolving; thus, employers tend to disagree as to the duties required and whether they actually comprise a distinct occupation. Additionally, occupations arise out of a number of social, economic, or environmental forces which are difficult to define and even more difficult to predict. This creates problems not only for the identification of new and emerging occupations but also for developing or locating curriculum materials. Furthermore, conventional procedures for estimating state-wide employment demand, e.g., employer surveys and employment projections, are generally not applicable to new and emerging occupations.

In recognition of the importance of providing training for new and emerging occupations and in response to the current lack of information suitable to state-wide needs, the state of Illinois awarded a contract to CONSERVA, Inc. of Raleigh, North Carolina. The purpose of the project was to identify

---

*This report was prepared by Conserva, Inc. which has just completed a report of the same title for Research and Development Section, Department of Adult, Vocational and Technical Education, Illinois Office of Education.

new and emerging occupations within the state and to determine the implications for curriculum development. A description of CONSERVA's approach to this problem and the results obtained from the study are presented in this synopsis.

Definition of New and Emerging Occupations

Prerequisite to the process of identifying new and emerging occupations was the necessity for developing a rationale for their definition. For the purposes of this study new and emerging occupations were defined as occupations which met the following four criteria:

- The occupation has come into existence within the past decade;
- The occupation is skilled or technical in nature, requiring at least six months of vocational education preparation but less than a four-year college program;
- There are no or limited vocational education programs within Illinois which are preparing students to enter the occupation; and
- Information is currently available which reflects an anticipated shortage of workers within the state over the next five years.

The time frame was chosen to limit the scope of the study to occupations which have emerged in the last decade. It was felt that ten years would allow adequate time for new occupations to become visible but not yet be established in terms of available training mechanisms. Because occupations do tend to emerge at different rates this criterion was treated flexibly throughout the study, with decision making relying more on evidence of need. The second criterion was chosen to assure that occupations identified were within the training confines of vocational education. Occupations requiring less than six months of education were considered more suitable to employment training. Those that require a baccalaureate degree were likewise not considered within the purview of vocational education. The final two criteria were interrelated in that they were selected to serve as indicators of need, that is whether a vocational program would provide some benefit to students and employers across the state. The fact that there are limited vocational program offerings in a specialty

indicates that there is potential need for curriculum development. The fact that there is evidence of employment demand justifies offering training for that occupation. The demand cut-off stipulated by the Illinois Office of Education for the purposes of this project was 20 openings per year over the next five years.

Project Methodology

Pursuant to the goal of identifying new and emerging occupations in Illinois, CONSERVA recognized that the project would require:

- Consideration of the variety of forces and processes which have an impact on occupations;
- A flexible and multi-faceted approach; and
- Ingenuity in utilizing existing data sources to estimate sub-state demand.

Thus, a variety of information sources were tapped during the course of the study. These sources were used to: (1) locate candidate occupations, (2) obtain occupationally relevant information, and (3) evaluate candidate occupations against new and emerging criteria.

Locating candidate occupations involved a review of previous research on new and emerging occupations, the identification of trends in legislation and technology and a survey of organizations. Previous research reviewed included a national study by Meleen, et al. (1976) and curriculum development for new and emerging occupations funded by the U. S. Office of Education and Illinois Office of Education (Technical Education Research Centers 1974, Rubenstein and Ramsey 1977, and Drewes 1977, respectively.) Concurrently, an analysis of technological and trade journals served to identify technological trends, and a review of recent state legislation and meetings with Illinois Legislative Council and staff members isolated legislative trends. The final means to locate candidate occupations involved contacting individuals representing organizations within each of the five Illinois vocational program areas: applied biological and agricultural occupations; business, marketing and management occupations; health occupations; industrial-oriented occupations; and personal and public service occupations. A sample of twenty organizations within each of the occupational areas was selected, and each was contacted by telephone in the effort to locate new and/or changing occupations.

The second step in the identification process, obtaining occupationally relevant information for each of the candidates, consisted of further contacting knowledgeable associations, employers, educational institutions, etc., and the utilization of published materials to supplement the information gained through these sources. Data were obtained on job duties, training, employers, sources of workers and demand for each of the new and emerging occupations. Where possible, estimates of demand for the occupations were obtained through linkages to established occupations or industries. This allowed the use of the Illinois Manpower Projections, produced by the Governor's Office of Manpower and Human Development, for estimating regional breakdown of future demand. In these cases projection of the regional demand for a new and emerging occupation can be estimated directly based on linkages with a parent occupation and existing projections of the demand for that parent occupation. For example, if each professional in a particular field requires two technician-level personnel and projections of the employment growth of the professional are available, the demand for the technician can be estimated based on the two-to-one ratio. When suitable linkages were not available use was made of growth rates of a related class of occupations, alternate state or national statistical summaries and subjective estimates obtained from the interviews. A detailed description of the estimation procedures used for each occupation is provided in the final report.

The final step in identification essentially constituted a decision-making process. Information gained through the variety of sources was compared to decide whether the occupations investigated qualified as new and emerging according to the project definition. Then, to accommodate occupations which were easily categorized in addition to those which exhibited promise but lacked solid evidence to be classified as new and emerging, occupations were grouped into three categories:

- Occupations which qualify as new and emerging;
- Occupations which possibly qualify as new and emerging;
- Occupations which do not qualify as new and emerging.

Thus, the identification procedure involved creating a network of informational sources. The approach was iterative in nature, simultaneously narrowing the scope of investigation and opening new areas for study. This facilitated the comprehensiveness of both the types of sources tapped during the course of the study and the occupations investigated.

Findings

Seven occupations were identified which qualified as new and emerging:

- Biomedical equipment technician
- Industrial hygiene technician
- Podiatric assistant
- Therapeutic recreation technician
- Swine confinement facility assistant manager
- Halfway house resident manager
- Solar energy technician

Additionally, twelve occupations were identified which have potential but for which the evidence was incomplete to permit classification as bona fide new and emerging occupations, and forty-five occupations were considered and excluded because they did not meet one or more of the criteria for new and emerging.

The following recommendations resulted from the study:

- Promote curriculum development activities for each of the seven new and emerging occupations.
- Disseminate the developed curricula for the new and emerging occupations.
- Develop a monitoring system to follow the potentially new and emerging occupations.
- Review occupations excluded from further consideration for their curricular applications.

References

Drewes, D. W. An Assessment of Employment and Training Needs for Coal and Gasification Occupations. Raleigh, North Carolina: CONSERVA, Inc., 1977. (Sponsored by the Illinois State Board of Education).

Governor's Office of Manpower and Human Development. Illinois Manpower Projections, 1978-1985 (Computer printout). Springfield, Illinois: 1978.

Meleen, P. S.; Gordon, A. K.; Livesay, S.; Donovan, J.; Shuchat, J.; and Bloom, S. Planning for Vocational Education: New and Emerging Occupations. Belmont, Massachusetts: Contract Research Corporation, 1976. (Sponsored by the U. S. Office of Education).

Rubenstein, S. A. and Ramsey, J. G. The Advent of Solar Energy: Implications for Vocational Education in Illinois. Amherst, Massachusetts: National Evaluation Systems, Inc., 1977. (Sponsored by the Illinois State Board of Education).

Technical Education Research Centers. Development of Career Opportunities for Technicians in the Nuclear Medicine Field. Cambridge, Massachusetts: TERC, 1974. (Sponsored by the U. S. Office of Education).

U. S. Congress. Education Amendments of 1976. Public Law 94-482, enacted October 12, 1976. Washington, D. C.: U. S. Government Printing Office, 1976.

U. S. Congress. Vocational Education Amendments of 1968. Public Law 90-576, enacted October 16, 1968. Washington, D. C.: U. S. Government Printing Office, 1968.

Appendix A-4

The Iowa Career Education Needs Information System*

Rationale

This data gathering project had its inception several years ago with an interagency approach toward creating more relevant and locally meaningful manpower needs information for use by planners and decision makers. All member-agencies of the Job Market Information Committee cooperated in the planning for this coordinated effort. Initial investigative efforts were conducted by the fifteen Iowa area vocational schools/community colleges, with each institution developing a contract with the Iowa Department of Public Instruction and using vocational education research funds to support the skilled needs survey in that area. Although the standard questionnaire developed by the Job Market Information Committee was used, timelines and methodologies employed in the fifteen surveys were substantially different. Accordingly, although valuable manpower planning data were available on an area basis, no statewide, comparable information was produced.

The next cycle of planning evolution resulted in the first operation of the Career Education Needs Information System (CENIS), in 1971-72. Though supported with vocational education funds, this investigative effort has always been strictly interagency in concept and operation. To fully round out the data needed by occupational planners, three more elements were added to the overall investigative thrust producing the present four-faceted data-gathering system:labor demand, labor supply, student interests, and student outcomes (follow-up). Data results from the four components are combined to form the CENIS Interface, a format which provides a profile of meaningful, interrelated data items for the vocational education/manpower decision maker.

In each of the four CENIS components data are gathered and presented both area-wide (with an Interface for each of the fifteen geographical areas) and for the state as a whole.

The target audience for CENIS information includes vocational education planners at all levels, CETA prime sponsors and team managers, vocational rehabilitation placement personnel, guidance and counseling personnel, and the varied providers of occupational information.

---

*This report was prepared by Mr. George Lowry, Iowa Department of Public Instruction.

There are seven objectives of CENIS:

1. To develop and provide an ongoing system for assessing current and projected data involving labor demand, labor supply, student interests, and student cutcomes.

2. To contact a representative sample of employers in each of the fifteen merged areas on a personal interview basis, and ascertain the current employment vacancies, projected expansion and replacement needs for one, three, and five years, and the number of individuals being prepared for the surveyed occupations through in-plant training.

3. To prepare a four-faceted indication of labor supply, showing training output from vocational education, private occupational schools, CETA, and private business and industry training.

4. To develop a Net Labor Demand entry, based upcn the difference between the identified labor demand and the total supply of persons being prepared in that occupation (this is the key element in CENIS).

5. To provide annual indicators of the occupational interests of 11th and 12th grade public and private secondary students, including their response to the occupations encompassed in the CENIS labor demand component plus many other professional and more broadly defined occupational areas.

6. To indicate program effectiveness by displaying the results of the vocational education student fcllow-up.

7. To interface the results of the four CENIS components to form a Manpower Planning Profile.

Procedures for Identifying Occupational Needs

Three steps are implemented in Iowa's procedures for determining occupational needs:

a. Identifying Occupations. The first criteria used in identifying occupational areas to be surveyed in the CENIS labor demand component was simply that of choosing occupations representative of the major taxonomy (course) area encompassed by current or anticipated vocational education programs. In addition, state level consultants and both secondary and postsecondary vocational education instructors, coordinators, and administrators reviewed the proposed lists and made suggestions. Finally, the current listing of approximately 300 occupations requiring less than a baccalaureate degree was developed, and is updated. Each CENIS cycle is an attempt to reflect potential new or changing occupations.

b. Occupational Data Utilized. The primary source of occupational data was the 3rd Edition Dictionary of Occupational Titles (DOT). Using the DOT for reference, brief job descriptions were prepared for all surveyed occupations to facilitate the identification of occupations by the employers.

c. Analysis, Organization, and Reporting of Findings. Output tables are prepared via computer printouts which replicate questionnaire entries for each surveyed occupation and also present data in a format which identifies the expansion and replacement ratios and indicates the total projected demand for the one-, three-, and five-year planning periods.

Procedures for Establishing Curriculum/Program Development Needs

There are three stages in the establishment of curriculum needs:

a. Identifying Curriculum/Program Areas. Table decks were prepared which converted the selected 300 specific occupations into pertinent USOE taxonomy classifications. In those instances where no taxonomy numbers have been designated, temporary taxonomy codes and titles were arbitrarily assigned. Again, the first consideration

was to include all programs currently being offered by secondary and postsecondary vocational education preparatory institutions. Prior to the final planning for each CENIS cycle, recommendations for modifying the programs to be encompassed in the survey are solicited.

b. Curriculum/Program Data Utilized. The primary references utilized were Standard Terminology for Curriculum and Instruction in Local and State School Systems (Handbook VI) and Vocational Education and Occupations.

c. Analysis, Organization, and Reporting of Findings. Output tables are developed by area and statewide to present pertinent data for each taxonomy area. Data analysis is performed by computer programs, except in those instances where the analysis of trends between cycles is conducted. Information is presented by taxonomy and is further subdivided to indicate data for each specific DOT classification within that taxonomy. Two priority listings are utilized: (1) The Primary Training Needs Areas, based on Net Labor Demand, with additional criteria applied giving extra consideration for training new to the area, or for new and changing occupational areas, and (2) The Program Area Priority List in which several different factors are weighed according to established formulas, the weights are summed, total points determined for each program area, and the program areas then arranged in rank order.

Interface reports are prepared for each merged area and for the state as a whole. These reports, along with the CENIS narrative descriptions are then disseminated to all secondary and postsecondary institutions offering vocational education programs; to CETA prime sponsors and team managers; to vocational rehabilitation placement counselors; to vocational guidance personnel; and to the Iowa State Occupational Information Coordinating Committee (SOICC).

Each new program proposal must contain a manpower needs analysis section which identifies the annual labor demand, anticipated labor supply, net labor demand and indicated student interest for that given occupational area.

Lessons Learned

The following are some thoughts for future action.

a. Changes in Future Studies.

1. Trade associations, design engineers, or similar knowledgeable groups should be contacted for suggestions for possible new or emerging occupations which could be incorporated into the CENIS labor demand survey.

2. The scope of occupations covered could be enlarged to include more lower-skilled occupations, as well as some professional occupations to make the resulting information more valuable to CETA decision makers and for guidance purposes.

b. Coordination with SOICC and OES.

1. A special Grants Proposal has been submitted to the National Occupational Information Coordinating Council from the Iowa SOICC which would combine CENIS and OES methodology in an attempt to demonstrate the feasibility of producing OES-type occupational information on a substate basis. The proposal would generate data on a county base--a common unit which can then be arranged in any type of larger area configuration desired, e.g., merged area (community school), CETA prime sponsor area and balance-of-state, Job Service administrative areas, etc.

2. The Iowa SOICC is now planning a User's Survey, which will be staffed and supported by CETA funds. This project would provide an opportunity to question potential users of occupational data concerning the types of information (including information on new and changing occupations) which would be most useful. Perhaps clues or indicators of hitherto unexpected sources of data on new and changing occupations may arise from this project.

APPENDIX A-5

Occupational Program Planning in Oklahoma*

Oklahoma established through a multi-agency agreement their Occupational Supply and Demand System in 1968. The purpose of this annual report to ennumerate current data on manpower supply and demand for selected occupations in Oklahoma. This data should be useful to occupational program planners and to those who are making career decisions. The data inputs in both the supply and demand sector have gone through a continuous improvement process. The occupational demand was first determined by the "Area Skill Survey" technique. Later, demand was obtained from a census based on the Bureau of Labor Statistics' Occupation-by-Industry Matrix. Oklahoma is now utilizing demand data from the Occupational Employment Statistics (OES) program, and was the first state to utilize occupational demand data developed by OES. The OES is a Federal-State Cooperative Program involving the Bureau of Labor Statistics (BLS) and the Employment and Training Administration (ETA) of the U. S. Department of Labor and the Oklahoma Employment Security Commission (OESC).

Briefly, the OES program has three basic components, (1) the OES survey (2) state and area industry projections and (3) the matrix system. The OES survey is that phase of the program in which the staffing patterns of each industry are identified. This is accomplished by contacting a representative number of employers in each industry within the nonfarm wage and salary sector of the economy to determine the number of workers employed in each occupation in each sample establishment. These sample data are then inflated to the total nonfarm wage and salary employment yielding estimates for each occupation in every industry surveyed.

Industry employment projections are a key element of the program. Forecasts of employment by three-digit code ultimately determine the level of employment in the occupational forecasts. Therefore, it is the industry projections, together with the survey data, that control the final output from the system.

Industry-occupational matrix development is the next phase of the program. The occupational estimates derived through the survey are arrayed in the form of an industry-occupational (I-O) matrix. The employment for each occupation in an industry is

*This report was prepared by Mr. J. B. Morton, Executive Director, State Occupational Information Coordinating Committee, Oklahoma State Department of Vocational and Technical Education.

described in terms of a ratio (or percent) of employment in that occupation to the total employment in that industry. By applying the industry projections to the I-O matrices, forecasts are derived for each occupation in each individual industry. These forecasts are then summed together to reflect total employment for each occupation without regard to industry.

At this point the occupational forecasts reflect only expansion needs, that is, the number of workers needed during a one-year period as a result of expansion or growth in an occupation. Replacement needs, that is, those workers needed to replace those who die or withdraw from the labor force, are also estimated at this time for the study period covered by the projections. Replacement needs are computed basically from working life tables and age / sex distributions in the census. It is the sum of expansion and replacement needs that yields the demand (or job openings) data presented in this report.

The OES system is now operational for use in subsequent years in developing occupational employment estimates and projected demand. Annual updates are possible incorporating the most recent industry projections and survey data. Limitations still exist regarding the size of the geographic area for which acceptable estimates can be generated. However, the OES program will undoubtedly continue to expand and develop to meet the changing and increasing needs of planners, educators, the Job Service, and many others in government and private industry concerned with human resource development.

There are four primary sources of manpower supply data used: the Oklahoma State Department of Vocational and Technical Education, the Oklahoma State Regents for Higher Education, the Comprehensive Employment and Training Act (CETA) prime sponsors, and the Oklahoma Employment Security Commission. Additional manpower supply data are provided by the Oklahoma Board of Private Schools, the Oklahoma Council for Health Careers, the State Board of Barber Examiners, the State Board of Cosmetology, and the Oklahoma Real Estate Commission.

The State Department of Vocational and Technical Education provides manpower supply data through the Student Accounting System, which reports vocational enrollment and completions by occupational training programs. Data included as Vo-Tech supply are an aggregation by training of all students who have acquired a marketable skill in the occupation for which they were trained and were available for the labor market as of October 1.

The State Regents for Higher Education provide manpower supply data on post-secondary vocational program graduates only. No study has been conducted to determine how many are actually available for the labor market.

The files for the Balance of State Comprehensive Employment and Training Act (CETA) graduates are maintained in the State Department office. The remainder are maintained by the individual prime sponsors. Both sources are combined for use as CETA supply and provided for use by the State Manpower Services Council.

The Oklahoma Employment Security Commission (OESC) provides data on the "Insured Unemployed"--persons who have registered as unemployed during the first week of August and have filed a claim to receive unemployment compensation. All Insured Unemployed claimants have had their job skills, in the occupation for which they are seeking employment, certified by the Oklahoma Employment Security Commission.

The supply and demand are interfaced utilizng the clustering of related occupations which are matched with programs that train workers for these occupations. A cluster may contain one or more occupations and one or more types of programs. The occupations are identified by the Dictionary of Occupational Titles and the programs identified by U. S. Office of Education code. The supply and demand data are interfaced and displayed for the state of Oklahoma, Oklahoma City, Tulsa SMSA's and six sub-state planning regions.

The net demand, demand minus supply, is a very important data item when planning occupational programs and making career decisions. However, in using manpower supply and demand and net demand data it is very important that limitations and varibles in supply data be taken into consideration. Some of the considerations are: (1) variations in quality of supply data (2) percentage of the program completers that are available for the labor market for each program by level, and (3) mobility of the program completers.

The Vocational Education State Planners and CETA Prime Sponsor Planners utilize the data to make decisions on occupational program planning and to decide in what area of the state the program would be most appropriate. The supply and demand data is utilized by the State Department of Vocational-Technical Education's Vital Information for Employment and Work (VIEW) Program in career information. Occupation needs are being established through the Supply and Demand system with additional data used as a supplement before decisions on programs are made. The Oklahoma State Department of Vocational-Technical Education develops a list of acceptable programs each year that is developed from the above data.

Occupational needs and program development drive the curriculum development. The priorities for occupational need, program development and curricular development are the same.

When any state looks for ways to improve the data used for planning programs, one need not look very far. There are areas in both the supply and demand sector that need improvement.

The supply sector could be improved dramatically with standardized definitions across all supply sources. It is hoped that in the future, with changes in legislation, agencies would be collecting standardized data. There is a good possibility that methodology will be developed that will permit one to gather supply data from a single source, thereby circumventing standardization.

The OES program has many advantages over any other demand projecting technique. In fact the OES program is a combination of the best parts of the area skill survey and the census based BLS matrix projecting techniques. It provides the very best occupational detail (approximately 1900 occupations) that is available, and has a built-in procedure for five year projections on occupations. Because it is still in the developmental stage at this time, it does not include the agriculture and self-employed employment categories.

We in Oklahoma feel that we have a viable system that provides supply and demand data that are needed for planning and for making career decisions. However, it is recognized that there are several years of work that need to be done in the areas mentioned above.

APPENDIX A-6

Educational Forecasting or Job Opportunities Forecasting in the State of Washington*

While these terms are not synonymous, it is important that we understand that each of these types of forecasts depends on the other. Educational forecasting must take into account the number of students needed by business and industry with the prescribed skills or professions. Additional allowance must be made for the number of students who must be enrolled over and above the demand in order to take up the slack caused by attrition and others who receive training in any one program area and are employed in another.

The Job Opportunities Forecast (JOF) supplies the information on the number of persons needed by business, industry or the professions in any specific job category. The process that is outlined in the following is sensitive to both the needs of educational and job forecasting by utilizing a crosswalk that combines the occupational-industry matrix with the vocational-technical or professional training categories. In the state of Washington, there are ten major agencies that are either users or suppliers of forecasting data. These groups of agencies are formed into a task force who supply direction in both policies, input and output requirements, and financial support.

- The Commission for Vocational Education in the State of Washington is the caretaker agency for producing the Job Opportunities Forecast and has been the chief supplier of funds in all three productions produced during the past six years.

- The Council on Postsecondary Education has been involved from the inception of the task force and has made valuable contributions to the necessity for technical and professional job categories and procedures for their development.

- The Department of Commerce and Economic Development supplies the input in the growth or decline of major business and industry.

---

*This report is based upon a presentation made by Mr. Raymond L. Harry, Washington State Board of Community Colleges at the World Future's Conference.

- The Employment Security Department, which in the state of Washington is an extension of the Department of Labor, supplies the necessary update for the data base in both the occupational and industrial classification categories.

- The Department of Revenue has, up to this time, furnished the economic forecast for the entire state. The economic forecast supplies the growth or decline data.

- The Office of Community Development is a user group and has under its wing the CETA operations for the balance of the state.

- The Office of Financial Management is the Governor's budget agency within the state and allocates the funds used by the various educational agencies--first in a block to the common school system, another block to the community college system, and separate allocations to the state-funded colleges and universities.

- The State Board for Community College Education utilizes the output data for both short-and long-range planning for vocational education programs.

- The Superintendent of Public Instruction uses the output information in the same way as the State Board for community colleges.

- The Washington Occupational Information Service disseminates information on employment and educational opportunities to the students in all education institutions within our state.

- A new agency, The State Occupational Information Coordinating Committee, is now a member of the task force and was established to comply with P.L. 94-482, in the dissemination of job opportunities forecast and supply information in the state of Washington.

The 1970 Census tallies were used as a data base along with the 1974 Bureau of Labor Statistics Update. This supplied 377 occupational categories and 184 industrial categories along with 12 worker categories. These 12 worker categories include private companies, Federal government, State government, local government, self-employed and the unpaid family worker. The 377 occupational categories are sorted with the 184 industrial categories. This industrial occupation

matrix extracts the various desired data elements from a data core that can be related to 70,000 cubby holes much the same as the sorting bins of an old post office (See Figure #1, p. 143).

The output data is then published into the format used in the job opportunities forecast. This forecast contains three sections. The first section accounts for vocational education programs that are currently being offered in the vocational education system in the state of Washington. The second is a display of the job opportunities for those kinds of programs that are not presently taught as preparatory vocational education programs. Most of these are either apprenticable or in an occupation where very little training is required - some reflect a large amount of industrial-based training or are in new and emerging occupations (See Figure #2). The third is the professional education programs that are offered both by the community colleges and the state college and university systems.

To arrive at the conclusions seen in Figure #2, Figure #3 (pp. 145-149) will show five examples of how the information is extracted from the 377 occupations and 184 industries matrix and transformed into the data base that results in the production of the job opportunities forecast. The first example (Figure #3) shows dental assistant -- #327 on the occupational matrix -- and requires a one-for-one assignment direct to the job opportunities forecast. Example two (Figure #4) uses occupation #129, real estate agent and broker, and occupation #166, real estate appraiser, and combines the categories into one training program for which people that are being placed as higher real estate agents and brokers or real estate appraisers receive their training. A third example (Figure #5) shows an agricultural and biological technician, category #023 in the occupational matrix, and industries #42 and #49 only being channeled into the vocational training program #16.03, food processing technician. This type of cross-assignment takes into account only persons that are employed in these agricultural/biological tech areas in these specific industries. Another example of this same nature would be nurses employed in the medical industry who are cross-walked into the medical secretary training program. Example four (Figure #6) shows industry 004, forestry, being converted into the output need for forestry technology using industry 004 only.

Example five (Figure #7) shows billing clerks, occupation #145, being split 50-50 into 14.01.01 accounting and 14.01.01 secretarial science. The reasoning for this is that through placement follow-up information, it is found that people securing employment in the billing clerk category have received

their training almost equally from accounting and secretarial science programs.

In referring back to Figure #2, we can now see the result of all these industrial occupational matrices and modifications that produce the job opportunities forecast. The base data that are a result of cross-walk and re-assignment are reflected into employment on the second line from the bottom in each of the vocational education categories. This employment will give, when multiplied by the replacement rate (bottom figure), replacement required during each fiscal year through 1985. The economic forecast applied to the employment figure will reflect the number of workers needed in that industry through expansion. The expansion and replacement numbers added together reflect the total demand for new hires during that year.

The shortcoming of this forecast is not being able to forecast the number of individuals who through internal job promotion or job migration may fill some of these projected vacancies or, in fact, leave additional job vacancies in other occupations that require training for job entry. In spite of this, during the past six years, this forecast has proven to be a valuable aid in educational planning in the state of Washington. This has allowed vocational education to do a better job of balancing employment needs with the output of the educational programs.

One example of how this forecast is used is shown on Figure #8, which is an excerpt from the 5-year State Plan for Vocational Education in the state of Washington. On this five-year plan showing the years 1978 through 1982, the projected employment is extracted from the job opportunities forecast to show the magnitude of the employment for those respective years. Just underneath that, the projected need reflects the demand figure from the forecast as an indicator as to how well the educational institutions are meeting the needs of business and industry. The weak point, again, on this type of display, is in the lack of supply information. For instance, the residual supply of trained personnel who are temporarily removed from the labor market is not indicated. Not all of the community based programs have supplied their projected enrollments for this document. It is hoped that the SOICC will assist in establishment of a better way to collect and disseminate supply information.

An additional use of the JOF, particularly in the community college system, is in the compilation of the education program control report. See Figure #9. This report shows the demand for new employees during the respective years and historical information on community college enrollment, placement,

enrollment-to-placement ratios, and percentages of demand being produced by the community college system. Under the recommendation code on the right hand side, as signified by an "M", "R", and "I", future direction is given in respect to the specific program. "M" indicates that enrollment should be maintained at the present rate. The "R" means review the program enrollment, placements and the reporting data for continuing the program. It is apparent that when you have a large enrollment-to-placement ratio, students are not being placed in the jobs for which they are being trained or you have an enrollment reporting problem or some other technical problem that shows up when you display data from different sources on a single document. Another code is an "I" which means incomplete information from any one of the many sources necessary for each program displayed.

Additional uses are a part of the long range enrollment forecasting process in the community college system. A complete program-by-program, campus-by-campus enrollment planning document is compiled by the SECCE Office every two years. During this two-year cycle, each community college offering a specific preparatory vocational education program submits a detailed year-by-year plan for the number of students they expect to have enrolled in the Fall quarter, which is termed to be the pacesetting or data base quarter for the year. A four-quarter unduplicated enrollment takes into account the total number of students who will be served in any one program for a particular year. This number will give some indication as to attrition during the year. These detailed enrollments for each college are compiled into a master planning document and compared back to the job forecast on a state-wide basis. This master plan is used as justification for the bi-annual budget request from the legislature.

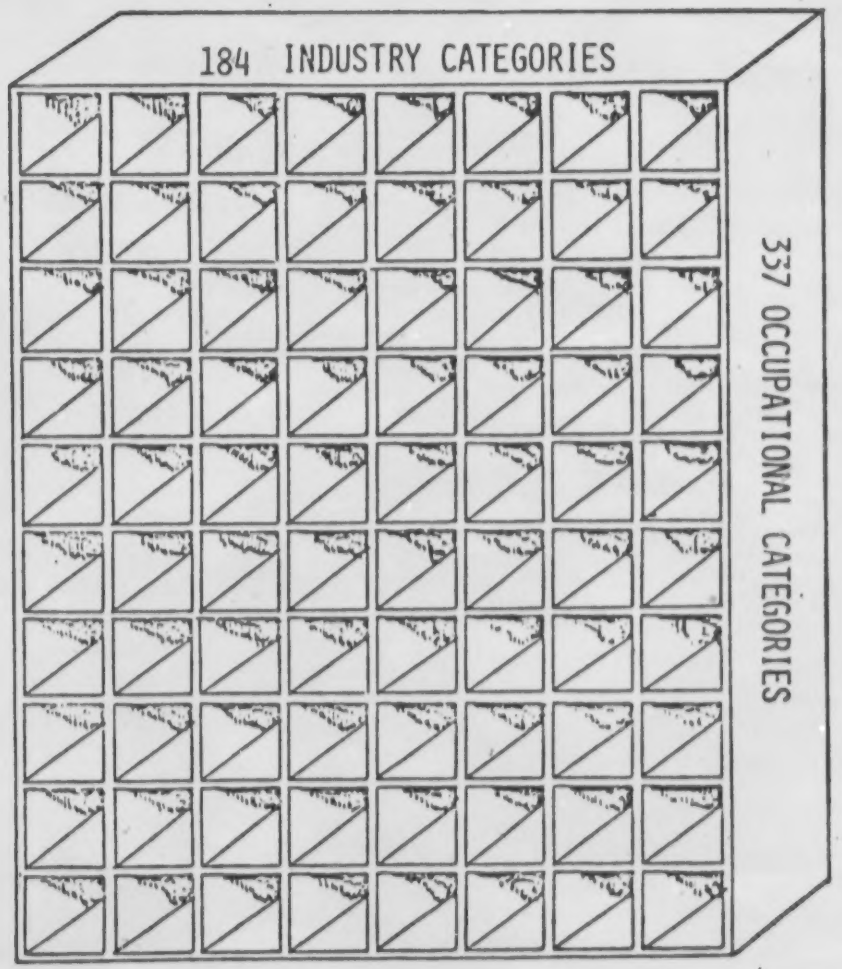
Planning and coordination of enrollments, and in particular, vocational education enrollments to match the needs of business and industry must be a priority of the total education community. Through the use of all planning tools, colleges can make the future of education brighter.

FIGURE 1

THE INDUSTRY-OCCUPATION MATRIX

143

- A CUPBOARD WITH 70 THOUSAND CUBBYHOLES



IND-OCC MATRIX

FIGURE 2

WASHINGTON STATE JOB OPPORTUNITIES FORECAST - THIRD EDITION

SECTION 2: POTENTIAL/EMERGING VOCATIONAL EDUCATIONAL PROGRAMS

JOF TABLE 37 — JUNE, 1977

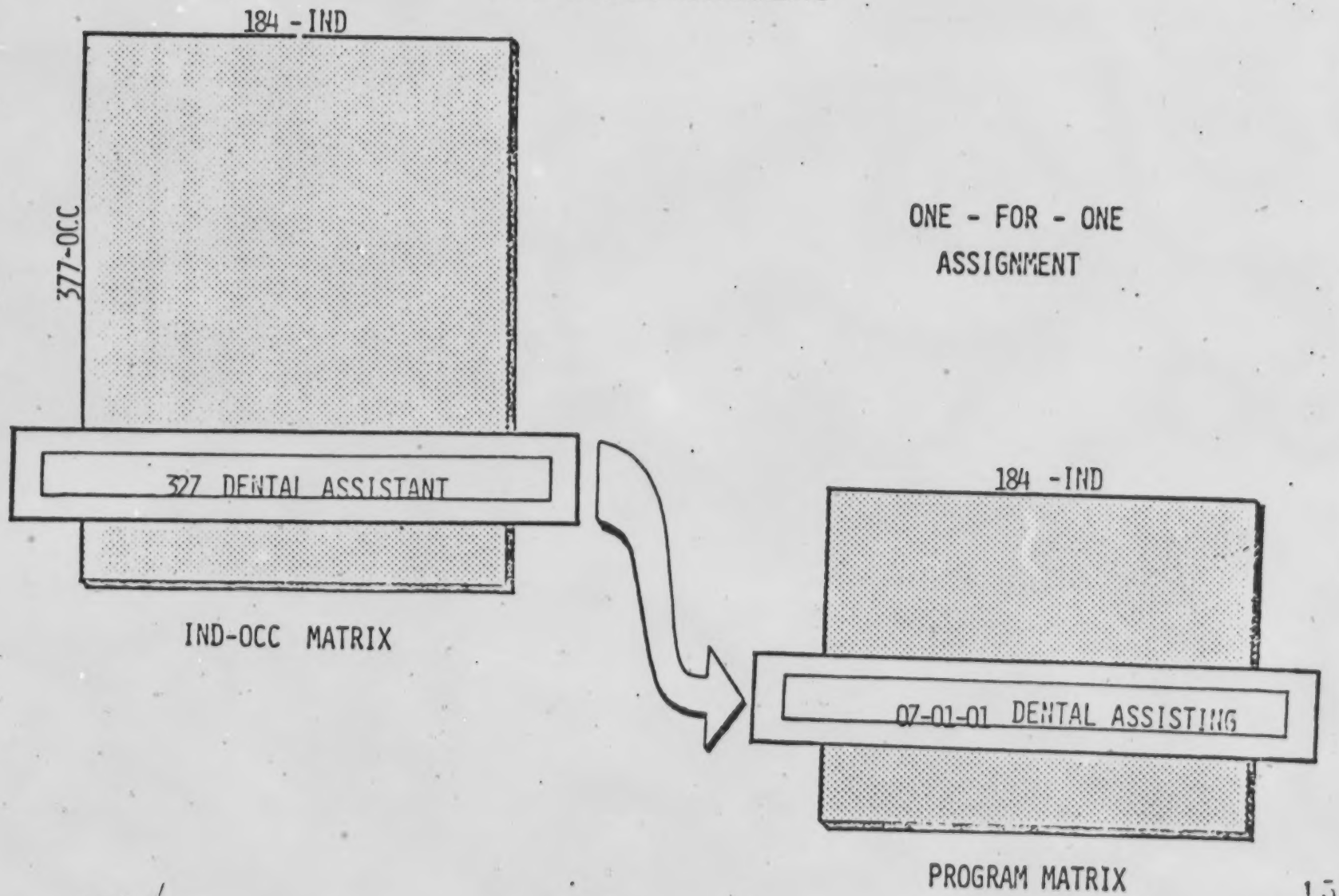
OE CODE	PROGRAM TITLE/ REFERENCE	DEMAND/ EMPLOYMENT	FISCAL YEARS 1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
17.23.04 X	Assemblers	Total Demand	672	279	-85	393	628	635	654	642	633	626	608	536
		Expansion	552	155	-208	264	487	483	490	468	451	435	409	330
		Replacement	120	124	123	129	141	152	164	174	182	191	199	206
		Employment	6,625	6,780	6,572	6,836	7,323	7,806	8,296	8,764	9,215	9,650	10,059	10,389
		Repl. Rate	.0181	.0184	.0187	.0189	.0192	.0195	.0198	.0198	.0198	.0198	.0198	.0198
17.23.07 X	Tool and Die Makers	Total Demand	22	13	-5	7	18	21	22	20	19	19	17	16
		Expansion	19	9	-9	3	14	16	17	14	13	13	11	9
		Replacement	3	4	4	4	4	5	5	6	6	6	6	7
		Employment	158	167	158	161	175	191	208	222	235	248	259	268
		Repl. Rate	.0221	.0226	.0231	.0235	.0240	.0245	.0250	.0250	.0250	.0250	.0250	.0250
17.23.97 X	Metal Working Trades, Nec.	Total Demand	128	63	-9	41	124	171	127	127	108	107	104	83
		Expansion	101	34	-38	11	92	136	89	87	67	65	60	39
		Replacement	27	29	29	30	32	35	38	40	41	42	44	44
		Employment	1,568	1,602	1,564	1,575	1,667	1,803	1,892	1,979	2,046	2,111	2,171	2,210
		Repl. Rate	.0175	.0179	.0183	.0188	.0192	.0195	.0200	.0200	.0200	.0200	.0200	.0200
17.23.98 X	Shipfitters	Total Demand	33	35	5	15	13	17	24	24	20	19	25	21
		Expansion	23	24	-6	3	1	4	11	10	6	5	11	7
		Replacement	10	11	11	12	12	13	13	14	14	14	14	14
		Employment	417	441	435	438	439	443	454	464	470	475	486	493
		Repl. Rate	.0251	.0257	.0264	.0271	.0277	.0284	.0291	.0291	.0291	.0291	.0291	.0291
17.23.99 X	Filers and Polishers	Total Demand	62	1	-13	27	49	53	46	44	42	37	34	26
		Expansion	36	-25	-39	1	21	24	16	14	11	6	3	-5
		Replacement	26	26	26	26	28	29	30	30	31	31	31	31
		Employment	1,108	1,083	1,044	1,045	1,066	1,090	1,106	1,120	1,131	1,137	1,140	1,135
		Repl. Rate	.0232	.0239	.0246	.0252	.0259	.0265	.0272	.0272	.0272	.0272	.0272	.0272
17.29.95 X	Butchers	Total Demand	96	107	80	90	86	103	105	99	88	81	74	71
		Expansion	44	52	23	31	25	39	38	31	20	12	5	2
		Replacement	52	55	57	59	61	64	67	68	69	69	69	69
		Employment	2,076	2,128	2,151	2,182	2,207	2,246	2,284	2,315	2,335	2,347	2,352	2,354
		Repl. Rate	.0250	.0257	.0264	.0271	.0278	.0286	.0293	.0293	.0293	.0293	.0293	.0293

Note: Before using values presented in this table see Part III, Section 1, Interpreting the Forecast Results.

JOF TABLE 37

FIGURE 3

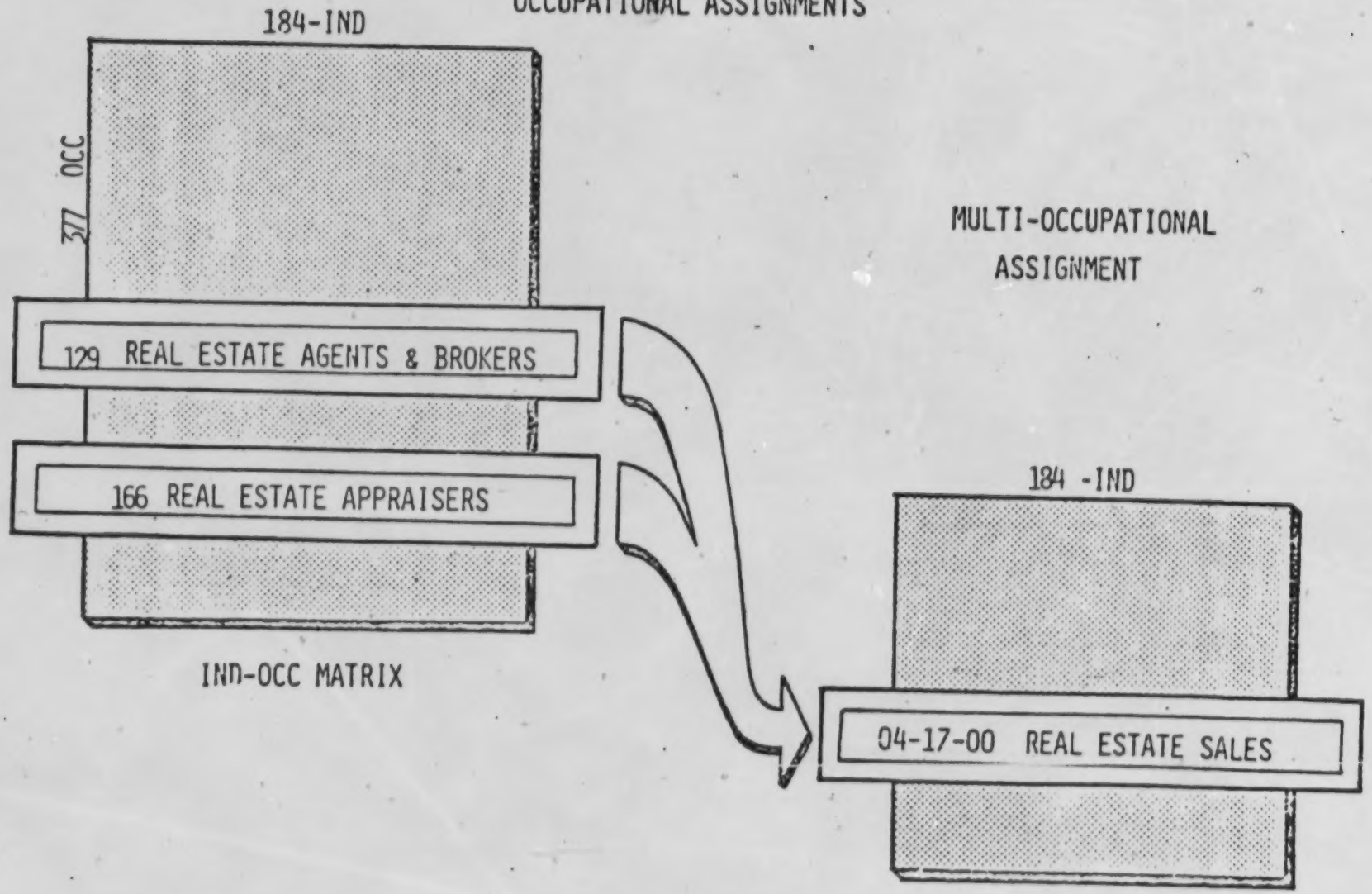
OCCUPATIONAL ASSIGNMENTS



EXAMPLE 1

FIGURE 4

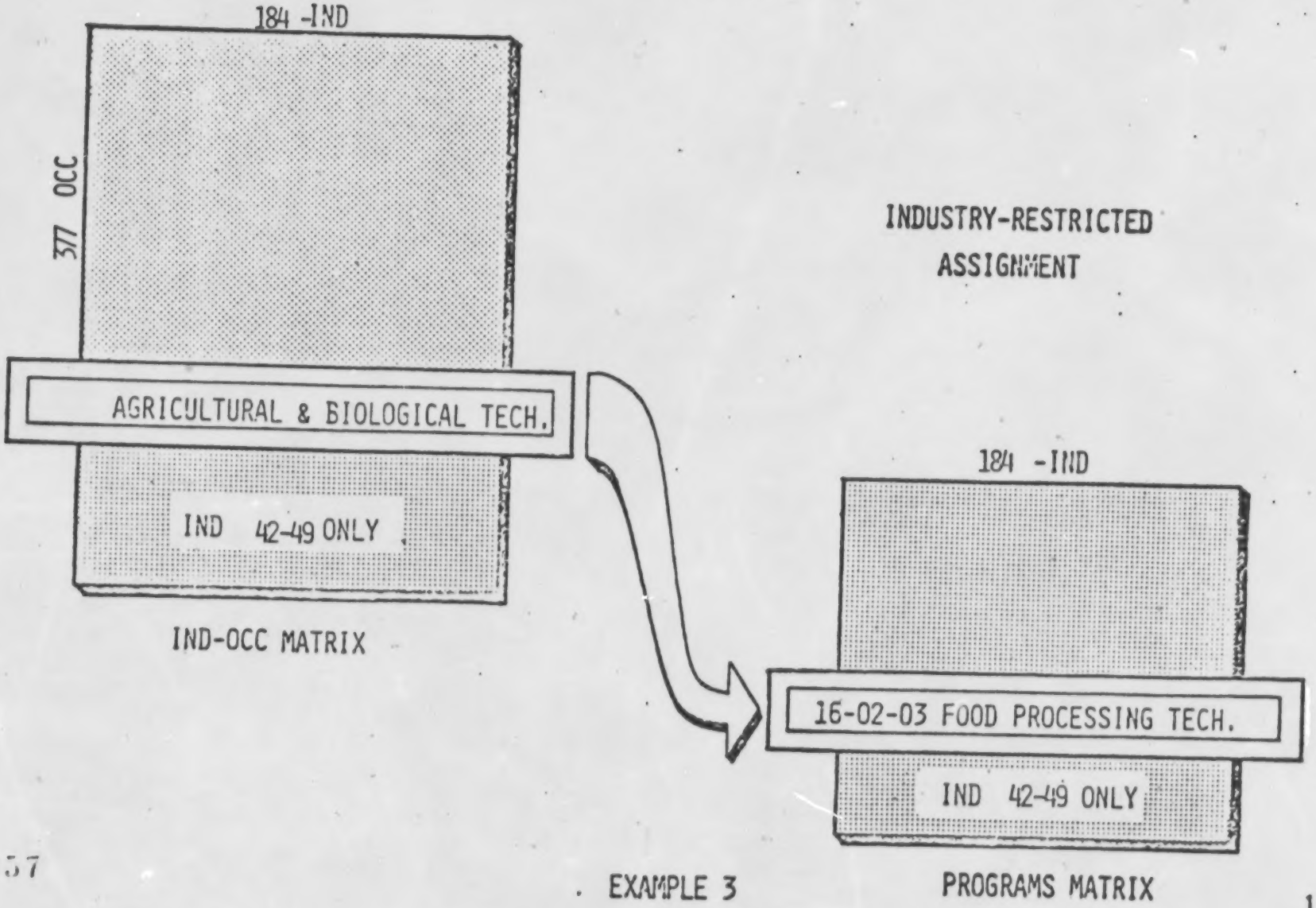
OCCUPATIONAL ASSIGNMENTS



EXAMPLE 2

FIGURE 5

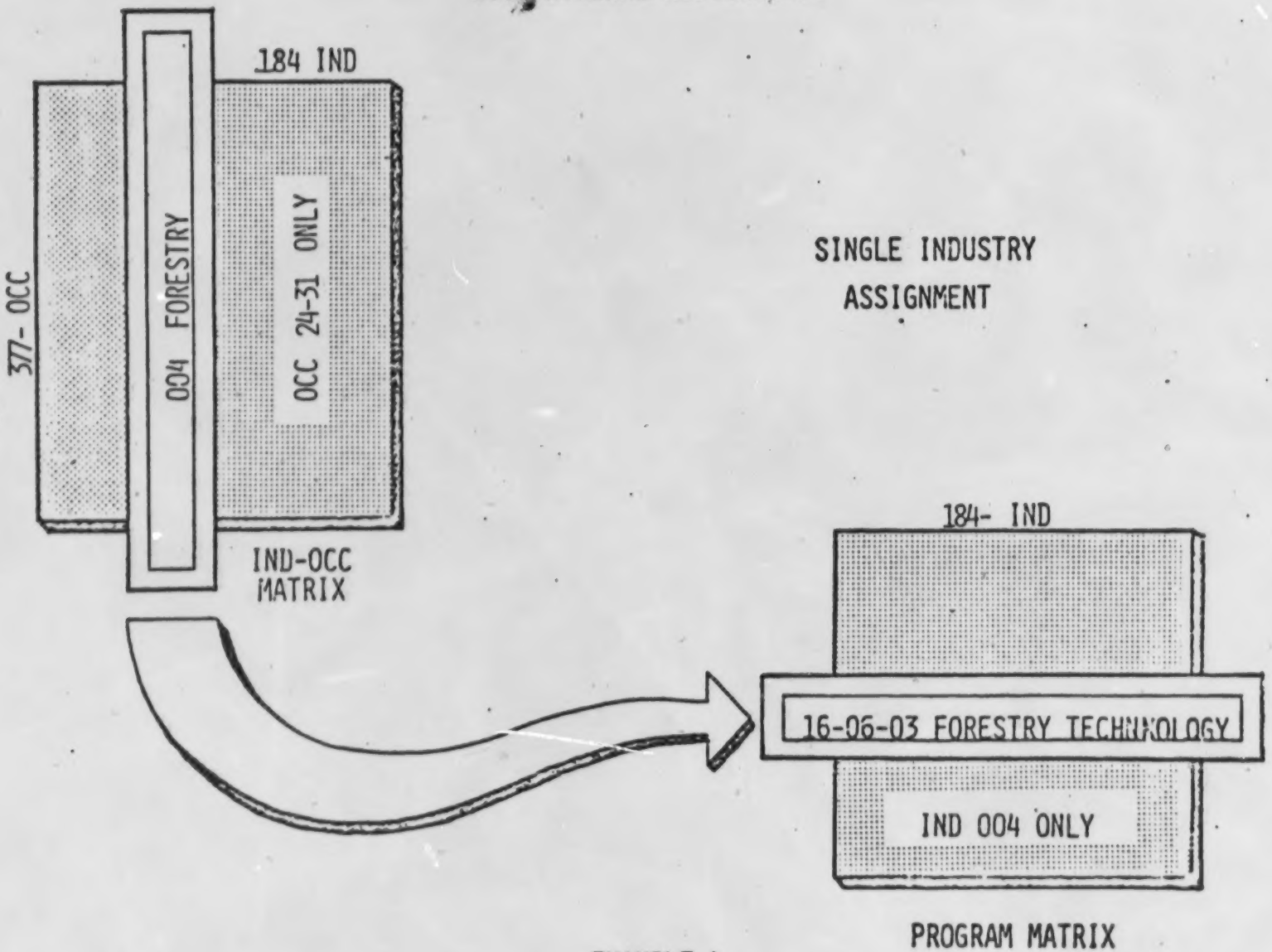
OCCUPATIONAL ASSIGNMENTS



EXAMPLE 3

FIGURE 6

OCCUPATIONAL ASSIGNMENTS



EXAMPLE 4

FIGURE 7
OCCUPATIONAL ASSIGNMENTS

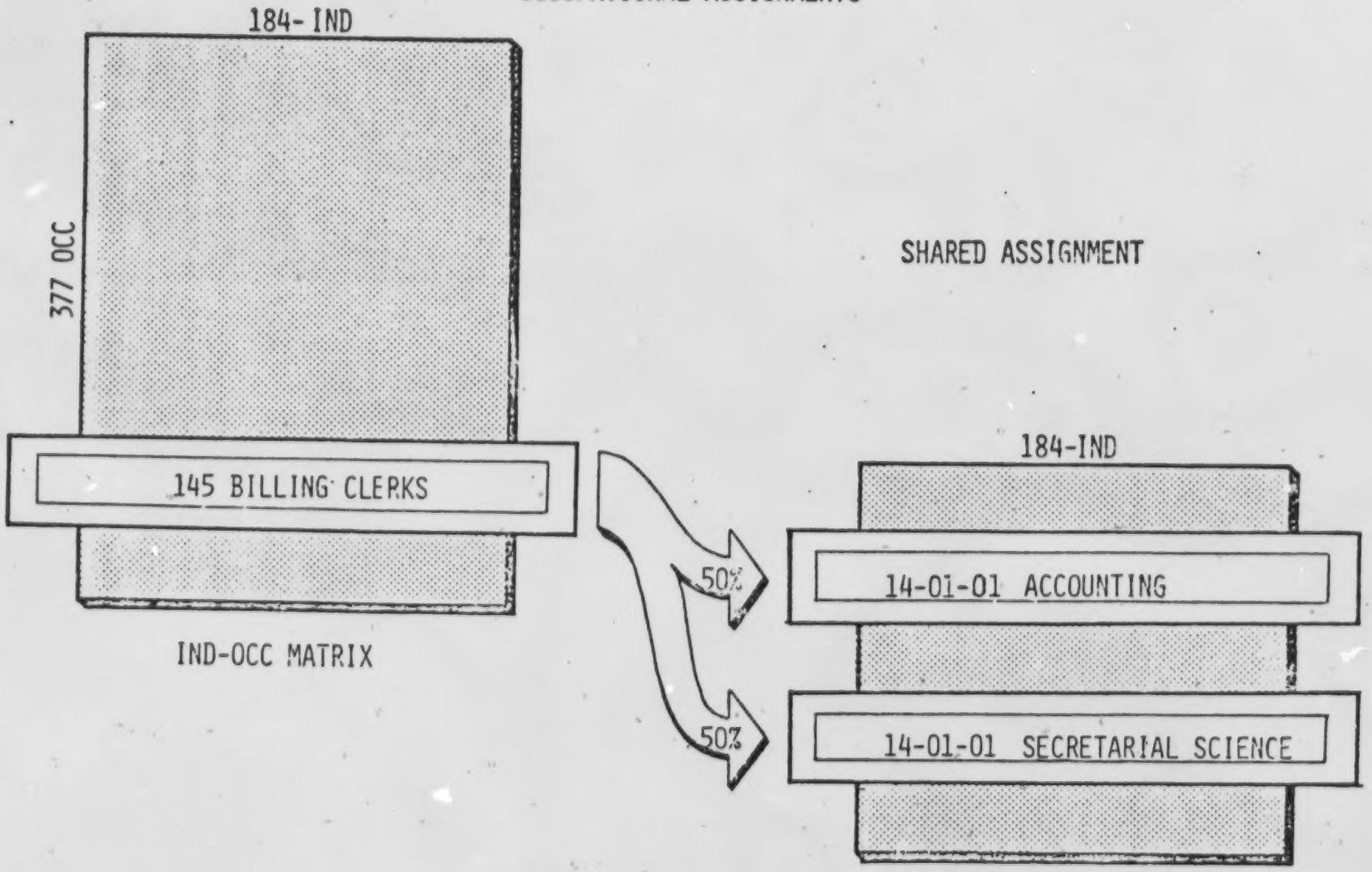


FIGURE 8

EMPLOYMENT OPPORTUNITIES AND VOCATIONAL EDUCATION PROGRAM SUPPLY

OE CODE	INSTRUCTIONAL PROGRAM	1978	1979	1980	1981	1982
17.21.02	Instrument and Watch Repair, Also See 17.21.00 Instrument Maintenance And Production					
	Projected Employment	382	390	399	406	412
	Projected Need	23	24	25	24	23
	Total Supply	21	21	21	21	21
	Secondary-High School					
	Postsecondary-Comm. Coll.	21	21	21	21	21
	Adult-Vocational-Technical					
	Adult-Private/Comm. Based					
	Adult-CETA	1				
	Adult-Other					
17.22.00	Marine Engineer					
	Projected Employment	388	399	410	421	432
	Projected Need	19	19	19	20	20
	Total Supply	83	72	84	91	62
	Secondary-High School					
	Postsecondary-Comm. Coll.	14	15	15	16	16
	Adult-Vocational-Technical	69	57	69	75	46
	Adult-Private/Comm. Based					
	Adult-CETA					
	Adult-Other					
17.23.02 Includes Mach. Operator and Iron Worker	Machine Shop					
	Projected Employment	34,636	35,330	35,999	36,714	37,516
	Projected Need	1,570	1,486	1,475	1,537	1,642
	Total Supply	687	712	667	788	825
	Secondary-High School	141	157	125	217	260
	Postsecondary-Comm. Coll.	178	181	184	192	192
	Adult-Vocational-Technical	258	264	248	259	253
	Adult-Private/Comm. Based	132	110	110	120	120
	Adult-CETA	2	1	1	1	1
	Adult-Other	2	2	3	3	3
17.23.05	Sheetmetal					
	Projected Employment	5,835	5,934	6,031	6,141	6,260
	Projected Need	225	197	196	212	223
	Total Supply	55	65	67	66	73
	Secondary-High School					
	Postsecondary-Comm. Coll.	18	21	27	27	27
	Adult-Vocational-Technical	37	44	40	39	46
	Adult-Private/Comm. Based					
	Adult-CETA	6	2	2	2	2
	Adult-Other	1	2	2	2	2

Figure 9

WASHINGTON STATE BOARD FOR COMMUNITY COLLEGE EDUCATION
OCCUPATIONAL EDUCATION FORECASTING SYSTEM
MANAGEMENT REPORTING SUBSYSTEM

EDUCATIONAL PROGRAM CONTROL REPORT: SBCCE
DATA VERSION: 7/29/77

TABLE	OE-CODE	OE-PROGRAM TITLE	LENGTH	HISTORICAL DATA		YEAR	DEMAND	SHARE	ENROL
67	17.06.00	OFFICE MACHINE REPAIR	2 YR	75 ENROL	110	1978	142	18	145
				76 ENROL	123	1979	145	18	145
				75 PLACE	17	1980	149	19	153
				76 PLACE	14	1981	150	19	153
				% DEMAND	12.7	1982	145	18	145
				EN-TO-PL	7.52	1983	145	18	145
						1984	143	18	145
67	17.07.00	COMMERCIAL ART	1-2 YR	75 ENROL	395	1978	287	23	545
				76 ENROL	493	1979	286	23	545
				75 PLACE	17	1980	297	24	568
				76 PLACE	27	1981	285	23	545
				% DEMAND	8.0	1982	276	22	521
				EN-TO-PL	20.18	1983	274	22	521
						1984	270	21	497
67	17.07.01	INTERIOR DECORATION ALSO SEE 17.10.05 PAINTing & Decorating	1-2 YR	75 ENROL	143	1978	213	27	206
				76 ENROL	172	1979	187	24	183
				75 PLACE	20	1980	201	26	198
				76 PLACE	22	1981	209	27	206
				% DEMAND	12.7	1982	204	26	198
				EN-TO-PL	7.50	1983	180	23	175
						1984	158	20	152
68	17.07.03	PRODUCT/PACKAGE Design Technology	1-2 YR	75 ENROL	-0	1978	14	0	0
				76 ENROL	-0	1979	13	0	0
				75 PLACE	-0	1980	14	0	0
				76 PLACE	-0	1981	14	0	0
				% DEMAND	0.0	1982	14	0	0
				EN-TO-PL	-0.0	1983	14	0	0
						1984	13	0	0

APPENDIX A-6 (continued)

APPENDIX B

PROJECT CONSULTANTS AND MEETINGS

		Page
B-1	Consultant Review Panel Meeting	154
B-2	Health Planning Panel Meeting	155
B-3	Task Force on Long Term Health Care Settings: Participants	156
B-4	Task Force on Long Term Health Care Settings: Agenda	160
B-5	Final Report External Consultant Reviewers	162

APPENDIX B-1

Consultant Review Panel Meeting

Meeting Participants

1. Max Carey
   Supervisor Labor Economist
   Bureau of Labor Statistics
   Division of Occupational Outlook
   441 G Street, NW - Room 2916
   Washington, D.C. 20212

2. Donald Drewes
   President, Conserva, Inc.
   401 Oberlin Road
   Raleigh, NC 27605

3. George Lowry
   Planning Consultant
   Iowa State Department of Education
   Grimes State Office Building
   Des Moines, IA 50319

4. Jeff Windom
   Director, SOICC
   Ohio Department of Education
   65 S. Front Street, #904
   Columbus, OH 43215

Project Staff

Pascal D. Forgione, Jr.
Project Director

A. Lee Kopp
Program Associate

Information for National Curriculum Development Priorities
Planning and Policy Function
Evaluation and Policy Division
National Center for Research in Vocational Education
1960 Kenny Road
Columbus, OH 43210

APPENDIX B-2

Health Planning Panel Meeting

Meeting Participants

1. Joseph Kadish
   Chief, Interdisciplinary Programs
   Division of Associated Health Professions
   Bureau of Health Manpower/Health Resources Administration/
   Public Health Services/DHEW
   3700 East-West Highway
   Hyattsville, MD 20782

2. Ruth-Ellen Ostler
   Chief, Bureau of Health Occupations Education
   New York State Education Department
   99 Washington Avenue
   Albany, NY 12230

3. Frances Glee Saunders
   Program Specialist, Health Occupations
   Bureau of Occupation
   U.S. Office of Education
   7th and D Streets, SW
   Washington, D.C. 20201

4. Sylvia Upp
   Director, Continuing Education
   Ohio State University
   School of Allied Medical Professions
   1583 Perry Street
   Columbus, OH 43210

Project Staff

Pascal D. Forgione, Jr.
Project Director

A. Lee Kopp
Program Associate

Information for National Curriculum Development Priorities
Planning and Policy Function
Evaluation and Policy Division
National Center for Research in Vocational Education
1960 Kenny Road
Columbus, Ohio 43210

APPENDIX B-3

Task Force on Long Term Health Care Settings

Task Force Participants

1. Joan Andrews**
   Director, Visiting Nurse Service-Summit County
   Secretary, National Association of Home Health Agencies and First Vice-President Ohio Council of Home Health Agencies
   1200 McArthur Drive
   Akron, OH 44320

2. Thom Aschenbrener**
   Health Manpower Education Specialist
   Division of Associated Health Professions
   Bureau of Health Manpower
   Health Resources Administration/Public Health Service/DHEW
   3700 East-West Highway
   Hyattsville, MD 20782

3. John Beckley
   Director, Dept. Allied Health Evaluation,
   American Medical Association
   535 N. Dearborn Street
   Chicago, IL 60610

4. Janice Caldwell*
   Director, Division of Long Term Care
   Office of Standards and Certification
   Health Standards and Quality Bureau
   Health Care Financing Administration/DHEW
   5600 Fishers Lane, Room 12-A-52
   Rockville, MD 20857

---

* Dr. Caldwell was unable to attend the task force meeting due to a conflict in her schedule. We wish to acknowledge her kind assistance in providing to the project staff resource materials and in planning the task force meeting.

** These individuals assisted the project staff in summarizing the findings of the various work groups on institutional and in-home care.

APPENDIX B-3 (continued)

5. Sarah Dean**
   Director, Mental Retardation Project
   Corporation for Health Education in Appalachia Ohio
   102 Hayes Hall
   Athens, OH 45701

6. Jack Hawkins
   Assistant Dean, School of Public and Allied Health
   University of Alabama in Birmingham
   University Station
   Birmingham, AL 35294

7. Elizabeth Kerr
   Director, Program in Health Occupations Education
   and Senior State Consultant, Health Occupations
   in Education
   University of Iowa
   MARA Building
   135 Melrose Avenue
   Iowa City, Iowa 52242

8. Eloise Kucera
   Consultant
   Long Term Health Care Education, Inc.
   P.O. Box 432
   El Cerrito, CA 94530

9. Jack Lukemeyer
   Vice Chancellor for Health Affairs
   Ohio Board of Regents
   30 East Broad Street
   36th Floor
   Columbus, OH 43215

10. Richard Miller
    Chief of PERT Section
    Ohio Commission on the Aging
    50 West Broad Street
    9th Floor
    Columbus, OH 43215

11. Gloria Morrow**
    Director, Research and Education
    American Health Care Association
    1200 15th Street, NW
    Washington, D.C. 20005

12. J. Warren Perry (Chairperson)
Professor, Health Sciences Administration
School of Health Related Professions
SUNY at Buffalo
714 Kimball Tower
Buffalo, NY 14214

13. Sonia Price
Assistant Director, Vocational Home Economics
Ohio State Department of Education, Room 912
65 South Front Street
Columbus, OH 43215

14. Nancy Robinson**
Director, Accreditation Program
National Council for Homemaker-Home Health Aide Service, Inc.
67 Irving Place, 6th Floor
New York, NY 10003

15. Frances Glee Saunders
Program Specialist, Health Occupations
Bureau of Occupational and Adult Education
U.S. Office of Education/DHEW
7th and D Streets, SW
Washington, D.C. 20201

16. Sean Sweeney**
Social Science Analyst
Education and Training Bureau
Administration on the Aging
Office of the Human Development Services
Office of the Secretary/DHEW
330 Independence Avenue, SW
Washington, D.C. 20201

17. William Throckmorton
Manpower Analyst
Division of Experimental Operations Research
Office of Research and Development
Office of Policy, Evaluation and Research
Employment and Training Administration
U.S. Department of Labor, Room 9006 PHB
Washington, D.C. 20213

Project Staff

Pascal D. Forgione, Jr.
Project Director

A. Lee Kopp
Program Associate

Information for National Curriculum
Development Priorities
Planning and Policy Function
Evaluation and Policy Division
National Center for Research in Vocational Education
1960 Kenny Road
Columbus, Ohio 43210

APPENDIX B-4

Task Force on Long Term Health Care Settings

Technician Level Employment and Training Needs

Tuesday, October 31, 1978 8:30 a.m. to 4:00 p.m.

National Center for Research in Vocational Education

1900 Kenny Road

AGENDA

8:15	Coffee
8:30	Introductions and Directions
8:45	Overview of Long Term Care Health Settings (J. Warren Perry)
9:15	Factors Affecting Long Term Care Health Settings Identify, discuss and rank factors and conditions affecting long term care health settings. (This information will provide a basis for developing scenarios for long term care health settings.) Nominal group process.
10:15	Break
10:30	Scenarios for Specific Settings Discuss how identified factors affect each of three specific long term care health areas: institutional, home, and related occupational areas. Small group discussions.
11:45	Lunch
1:15	Report from Small Groups and Reactions
2:15	Employment Opportunities Identify and define new and changing occupations and high demand employment opportunities for long term care health settings. Small group discussions.
3:45	Information for Tomorrow's Session
4:00	Tour of OSU Campus and Visit to National Center (optional)

APPENDIX B-4 (continued)

Task Force on Long Term Health Care Settings

Technician Level Employment and Training Needs

November 1, 1978 8:30 a.m. to 2:30 p.m.

National Center for Research in Vocational Education

1900 Kenny Road

8:15	Coffee
8:30	Status of Training Identify and discuss the status of training for identified occupations including existing programs, relevant professional organizations and accrediting agencies, and licensure requirements. Small group sessions.
10:15	Break
10:30	Report from Small Groups and Reactions
11:30	Lunch
1:00	Summary and Recommendations
2:30	Good-bye

(Writers will have an additional 1 hour debriefing meeting)

APPENDIX B-5

Final Report External Consultant Reviewers

Consultant Reviewers

1. Wilma Gillespie
   Associate Professor
   Occupational and Career Education
   School of Education
   University of Louisville
   208 Otter Hall
   Louisville, KY 40208

2. Richard Wilson
   Vice President for Programs
   American Association of Community
   and Junior College
   One Dupont Circle, N.W.
   Suite 401
   Washington, D.C. 20220

APPENDIX C

DEFINITION OF LONG TERM
HEALTH CARE TERMINOLOGY *

1. Domiciliary Care Facility (DCF): a nonmedical residential institution providing room, board, laundry, some form of personal care, and, in some cases, recreational and social services. Most commonly licensed by state departments of social services, these facilities usually are not allowed to provide medical care as part of the direct services of the institution. They are not eligible for reimbursement through either Medicaid or Medicare, but in several states they do receive public funds through special state supplements to the Supplemental Security Income (SSI) program.

2. Home Health Agency: an agency that provides home health care. To be certified under Medicare an agency must provide skilled nursing services and at least one additional therapeutic service (physical, speech or occupational therapy, medical social services, or home health aide services) in the home. Under Medicaid, states may, but do not have to, restrict coverage to services rendered by certified home health agencies.

3. Home Health Aide Services: same as personal care services; they may be provided by an aide under the supervision of a professional nurse, or a physical, speech, or occupational therapist. In addition, they may include homemaking services such as shopping, meal preparation, some light housekeeping.

4. Home Health Care: health services rendered to an individual as needed in the home. Such services are provided to aged, disabled, sick, or convalescent individuals who do not need institutional care. The services may be provided by a visiting nurse association (VNA), home health agency, hospital, or other organized community group. Services may include nursing services, speech, physical, occupational and rehabilitation therapy, homemaker services, and social services.

5. Homemaker Services: environmental services such as cooking, shopping for food, housekeeping, home management tasks.

---

* Source: A Discursive Dictionary of Health Care, Subcommittee on Health and the Environment, Committee on Interstate and Foreign Commerce, U.S. House of Representatives, February 1976.

6. Hospice Care:* is herein used to describe an environment of caring for terminally ill persons of any age and their families. Hospice care may be delivered through a home care program, inpatient facility, or a combination of both arrangements. The goal of hospice care is to provide a caring community for terminally ill patients, their families and hospice workers, both professional and volunteer. The caring climate of the hospice is designed to provide relief from pain, which encompasses physical, emotional, and spiritual pain, for the patients and their families during the time of anticipated death. Hospice care differs from traditional forms of health care in that hospice teams assist the family in coping with the effects of the patient's terminal illness, as well as in providing medical care to the patient.

7. Intermediate Care Facility (ICF): an institution recognized under the medical program which is licensed under state law to provide, on a regular basis, health-related care and services to individuals who do not require the degree of care or treatment that a hospital or skilled nursing facility is designed to provide, but who because of their mental or physical condition require care and services (above the level of room and board) that can be made available to them only through institutional facilities. The distinction between "health-related care and services" and "room and board" has often proven difficult to make, but is important because ICFs are subject to quite different regulation and coverage than institutions that do not provide health-related care and services.

8. Medical Social Services: physician-directed services provided by social workers in order to deal with health-related social and emotional problems.

9. Occupational Therapy Services: medically directed treatment of physically and/or mentally disabled individuals by means of constructive activities designed and adapted by a professionally qualified therapist to promote the restoration of useful function.

10. Personal Care Services: bathing, toileting, feeding; assistance with ambulation; assistance with prescribed exercises and medication; physical supervision, as of elderly persons whose movements are unsure; teaching and emotional support tasks such as showing a newly blinded person how to handle daily living tasks; showing a mother ways to cope with a disabled child. These services may be provided by a home health aide.

---

*Aschenbrener, Thomas. Bureau of Health Manpower, Washington, D.C. Personal Conversations between October and December 1978.

11. Physical Therapy Services: the use of physical agents, biomechanical and neurophysiological principles, and assistive devices in relieving pain, restoring maximum function, and preventing disability following disease, injury or loss of a part of the body.

12. Skilled Nursing Services: nursing services that must be furnished by or under the direct supervision of a licensed nurse; for example, administration of prescribed medications that cannot be self-administered, the changing of indwelling catheters, the application of dressings involving prescription medications and aseptic techniques, and, in certain cases, skilled nursing observation and evaluation.

13. Skilled Nursing Facility (SNF): under Medicare and Medicaid, an institution (or a distinct part of an institution) that has in effect a transfer agreement with one or more participating hospitals and that: (1) is primarily engaged in providing skilled nursing care and related services for patients who require medical or nursing care, or rehabilitation services for the rehabilitation of injured, disabled or sick persons; (2) has formal policies developed with the advice of a group of professional personnel including one or more physicians and one or more registered nurses, to govern the skilled nursing care and related medical or other services it provides; (3) has a physician, a registered professional nurse, or a medical staff responsible for the execution of such policies; (4) has a requirement that the health care of every patient be under the supervision of a physician, and provides for having a physician available to furnish necessary medical care in case of an emergency; (5) maintains medical records on all patients; (6) provides 24-hour nursing service and has at least one registered professional nurse employed full time. Effective October 30, 1972, the 1972 Amendments permit the Secretary of HEW, to the extent that this provision may be deemed to require that any skilled nursing facility engage the services of a registered professional nurse for more than 40 hours a week, to waive the requirement if he finds that certain requirements are met; (7) provides appropriate methods and procedures for the dispensing and administering of drugs and biologicals; (8) has in effect a utilization review plan that meets the requirements of the law; (9) in the case of an institution in any state in which state or applicable local law provides for the licensing of institutions of this nature, is licensed pursuant to such law, or is approved by the agency of the state or locality responsible for licensing institutions of this nature as meeting the standards established

for such licensing; (10) has in effect an overall plan and budget, including an annual operating budget and a three-year capital expenditures plan; (11) effective July 1, 1973, supplies full and complete information to the Secretary as to the identity of each person having (directly or indirectly) an ownership interest of 10 percent or more in the facility; in the case of a skilled nursing facility organized as a corporation, of each officer and director of the corporation; and in the case of a skilled nursing facility organized as a partnership, of each partner; and promptly reports any changes that would affect the current accuracy of the information so required to be supplied; (12) effective July 1, 1973, cooperates in an effective program that provides for a regular program of independent medical review of the patients in the facility to the extent required by the programs in which the facility participates (including medical evaluation of each patient's need for skilled nursing facility care); (13) effective July 1, 1973, meets such provisions of the Life Safety Code as are applicable to nursing homes; except that the Secretary may waive, for such periods as he deems appropriate, specific provisions of the Code that if rigidly applied would result in unreasonable hardship for a nursing home, but only if such waiver will not adversely affect the health and safety of the patients (except, the provisions of the Code will not apply in any state if the Secretary finds that in the state there is in effect a fire and safety code imposed by state law that adequately protects patients in nursing facilities); and (14) meets any other conditions relating to the health and safety of individuals who are furnished services in such institution or relating to the physical facilities thereof as the Secretary may find necessary. Effective October 30, 1972, the Secretary is prohibited from requiring, as a condition of participation, that a skilled nursing facility furnish medical social services to its patients. However, when these services are provided, it is expected that they conform to recognized standards (see Section 1861 of the Social Security Act).

14. Speech Therapy Services: treatment of defects and diseases of the voice, of speech, and of spoken and written languages.

APPENDIX D

FORCES, FACTORS AND TRENDS IMPACTING ON LONG TERM HEALTH CARE SETTINGS

A. Societal/Cultural Conditions

Longevity and increasing number of aged in population

Mobility of society

Focus on process of maintaining the dignity of elderly; i.e., loneliness, transportation, self-worth

Increased sophistication of family and individuals who believe they should be provided with the services they need; "wiser consumers"

Inhumane treatment of elderly/disabled/retarded

Increased work expectations of additional segments of the population as a result of the civil rights/affirmative action/ages discrimination movement

Non-focus on non-elderly because of focus on the aged; veterans and disabled young adults have needs different from the elderly

Increasing cultural conflict in meaning and value of life; e.g., battered persons vs. abortion on demand; "death with dignity" as a euphemism for euthanasia vs. increasing technologies to keep people alive

Increased knowledge of family in dealing with how to cope with a family member who needs long term care services

Medical advances

B. Financing

Identification of cost effective approaches to delivery of services including development of a system for payment of services and identification of ecomonic factors affecting life style and service delivery

Identification of capital for instructional and non-instructional growth

Difficulties with reimbursement processes and control mechanisms which need to be assessed

Need to consider the nature of long term care facilities, e.g., 74% of all nursing homes are proprietary in nature; role of competition

Identification of health care costs by comsumer groups

C. Education & Training - Personnel & Staff

There is a lack of information on the availability of training programs

Reduce fragmentation of training

Training to meet the needs of clients (and recognizing)

Inadequate orientation, re. aging in health professions curricula

Professions threatened by new workers

Licensure certification and approval requirements so highly structured they are not realistic

Need to determine if interdisciplinary approach is best vs. need for new types of manpower

Need for career lattices

Need to identify competencies

There is a need of attitudinal training for all staff

Enable decision makers for older persons to be knowledgeable about "channeling" agencies

Trend toward overeducation for competencies that are needed

Inadequate consumer education programs relative to services available

Human Resources attrition

Recruitment for long term care

Integration of biomedical research on aging in long term care settings

Integration of specific curriculum, i.e., gerontology across other health programs

Increasing cultural conflict in meaning and value of life, e.g., battered persons vs. abortion on demand

Suitability of the mode of training programs for target student groups

Professionals in LTC administration not trained in administration disciplines

D. Regulation/Control

Eligibility criteria for state and federal programs

Lack of co-ordinated adequate public policy at federal, state, and local level; Needs to support long term care activities (regulations exist, not policy)

Standards for long term settings are not geared to the setting

Licensure, certification requirements relating to providers often not focused on the needs of clients

Federally mandated state administered and controlled "certificate of need" for long term care settings, e.g., Section 1122

There is a need for accountability in the system as we increase services

Protecting turf by health professions

E. Planning

The incorporation in the health planning legislation (P.L.93-641) through the health service area wide (HSA & SHPDH) evaluation of existing services and recommendations; approval of "manpower" education programs, and development of new services or deletion of existing long term care services. Focus of these plan development activities on cost, quality, availability, accessability, acceptability and continuity.

Public policy based on the health plans and recommendations of the HSPs and SHPs

Promotion by professional associations, licensure and certification and accreditation bodies (both health professionals and facilities) of the principles of long term care

The development and acknowledgement of realistic expectations of long term care services outcomes

F. Coordination for Services

Planning together and interagency cooperation

Need for innovation and replicable models for the delivery of services

Dissemination of "good practices" and "models" to states and service deliverers

Enabling all who make decisions for older persons (i.e., professionals) to be knowledgeable about alternative "channeling" agencies

The problem of "pigeon-holing" the needs of long term care clients

Lack of orchestration and commitment from all service

Integration of biomedical research on aging into long term care settings

APPENDIX E

RECENTLY ADOPTED AND PROJECTED OCCUPATIONAL PROGRAMS IN POST-SECONDARY SCHOOLS

Page

E-1 . . .Programs in Fiscal Year 1976 - 77 172

E-2 . . .Programs in Fiscal Year 1977 - 78 180

E-3 . . .Programs in Fiscal Year 1978 - 79 197

E-4 . . .Programs: Current 214

E-5 . . .Programs: Projected 223

APPENDIX E-1

Recently Adopted and Projected Occupational Programs in Post-secondary Schools Fiscal Year 1976 - 1977

Program Area: Agriculture

Course/Program Title	State
1. Agribusiness	WI
2. Equine Management	WI
3. Farm Business Management	WI
4. Sales/Service	WI

APPENDIX E-1 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1976-1977

Program Area: Consumer & Homemaking, Occupational Preparation

Course/Program Title		State
1. Child Care/Management		OH
2. Culinary Arts		PA
3. Domestic Problems & Crises		AZ
4. Family Day Care	Short term	WI
5. Food Service Technology		SC
6. Institutional Foods Aide	Short term	WI
7. The Law of Family Relations		AZ

APPENDIX E-1 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1976-1977

Program Area: Distribution

Course/Program Title	State
1. Advertising Art	PA
2. Animal & Food Industries	SC
3. Automotive	OH
4. Cookery	WI
5. Diesel	OH
6. Insurance	OH
7. Insurance & Personal Injury Law	AZ
8. Marketing-Materials	WI
9. Marketing-Radio TV	WI
10. Real Estate	OH
11. Real Estate Construction	AZ
12. Real Estate Escrow Procedures	AZ
13. Restaurant and Hotel	WI
14. Sales	WI
15. Transportation Management	SC

APPENDIX E-1 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1976 - 1977

Program Area: Health

Course/Program Title	State
1. Dental Assistant	WI
2. Dental Assisting	PA
3. Emergency Medical Service	PA
4. Emergency Medical Technician - Paramedic	OH
5. Emergency Med. Technology Refresher	AZ
6. Medical Assisting	OH
7. Medical Laboratory	OH
8. Mental Health	OH
9. Medical Transcriptionist	PA
10. Nuclear Medicine	PA
11. Nurses Aide	HI
12. Ophthalmic Science	PA
13. Pre-Allied Health	PA
14. Radiologic	OH
15. Radiologic Technology	PA
16. Radiologic Technology	WI
17. Respiratory Therapy	OH
18. Respiratory Therapy	PA

APPENDIX E-1 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1976 - 1977

Program Area: Office

	Course/Program Title	State
1.	30-Week Account Clerk/Bank Teller Training CETA	WI
2.	Financial Services Assistant	WI
3.	Business Management	OH
4.	Clerk, General Office CETA	WI
5.	Clerk-Typist CETA	WI
6.	Court/Conference Reporting	OH
7.	Data Processing	OH
8.	Financial Services Aide Short term	WI
9.	Security Administration	OH
10.	Security Supervision	PA
11.	Telecommunications	PA

APPENDIX E-1 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools Fiscal Year 1976 - 1977

Program Area: Technical, Trades & Industry

	Course/Program Title		State
1.	Agricultural and Automotive Parts		WI
2.	Architectural Drafting		PA
3.	Auto Body Technology		PA
4.	Auto Service		PA
5.	Auto Technology		PA
6.	Automotive Service		PA
7.	Aviation Technology		SC
8.	Building Maintenance, General	CETA	WI
9.	Climate Control		OH
10.	Combination Welder	CETA	WI
11.	Communication Equipment Servicing	Short term	WI
12.	Criminal Justice		SC
13.	Criminal Justice		PA
14.	Criminal Justice Administration		PA
15.	Diesel Mechanics		PA
16.	Diesel Technology		PA
17.	Drafting Design		OH
18.	Electronics Technology		SC
19.	Funeral Service		PA
20.	Government and Public Service		SC

APPENDIX E-1 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools Fiscal Year 1976 - 1977

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
21. Industrial Management	PA
22. Law Enforcement	OH
23. Machine Technology	PA
24. Management	SC
25. Manufacturing	OH
26. Personnel Technician	WI
27. Photography	PA
28. Plant Maintenance	OH
29. Preparatory Plumbing (Short term)	WI
30. Production Machine Operator (Racine) CETA	WI
31. Public Administration	PA
32. Reproduction Graphics	AZ
33. Safety/Risk Management	OH
34. Security	PA
35. Small Engine and Chassis Mechanic	WI
36. Small Engine Servicing Short term	WI
37. Social Services	OH
38. Social Welfare	SC
39. Special Problems in Law Enforcement	AZ
40. Urban Public Affairs	SC
41. Welding CETA	WI
42. Welding Fabrication	OH

APPENDIX E-1 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1976 - 1977

Program Area: Other

	Course/Program Title	State
1.	Anthropology (Conservation Archaeology)	SC
2.	Cellular & Molecular Biology and Pathobiology	SC
3.	Goal Oriented Adult Learning (GOAL)	WI
4.	Home Aids for the Elderly CETA	WI
5.	Independent Study	AZ
6.	Institute for Economic Development	SC
7.	Introduction to Human Physiology	AZ
8.	Introduction of Law	AZ
9.	Introductory Microbiology	AZ
10.	Introduction to Pathological and Physiological Chemistry	AZ
11.	Labor Studies	OH
12.	Labor Studies	PA
13.	Microbiology	AZ
14.	Music History (Musicology)	SC
15.	Occupational Studies	PA
16.	Physical Geology	AZ
17.	Pre-Vocational Training for Criminal Ex-Offenders	WI
18.	Psychology of Motivation in Mfg.	AZ

APPENDIX E-2

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Agriculture

Course/Program Title		State
1.	Agribusiness	MS
2.	Agribusiness Operations	WI
3.	Agriculture Production Tech.	WA
4.	Cotton Gin Management	MS
5.	Farm Management	MS
6.	Farm Mechanics	MS
7.	Forestry Technology	MS
8.	Horticulture	MS
9.	Industrial Forestry	WA
10.	Irrigation and Crop Production	WI
11.	Livestock Management	MS
12.	Livestock Mgt.	WA
13.	Meat Processing and Merchandizing	MS
14.	Ornamental Horticulture	MS
15.	Production Agriculture, Advanced (Short Term)	WI

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Consumer & Homemaking, Occupational Preparation

Course/Program Title		State
1.	Child Care	PA
2.	Child Care & Development	MS
3.	Clothing	MS
4.	Consumer/Family Manager	WI
5.	CETA Cooks	WI
6.	Early Childhood Education	WA
7.	Food Preparation Assistant	WI
8.	Food Processing (CETA)	WI
9.	Food Service (CETA)	WI
10.	Food Service Domestic	MS
11.	Food Service/Kitchen Helper (Short Term)	WI
12.	Food Service Management	OH
13.	CETA Homemaker Training	WI
14.	Human Relations Group Dynamics	AZ
15.	18-Week Meat Cutter's Training (CETA)	WI

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Distribution

Course/Program Title		State
1.	Automotive	OH
2.	Cashier-Checker (CETA)	WI
3.	Route Sales Checkout Attendant (CETA)	WI
4.	Diesel	OH
5.	Distribution & Marketing	MS
6.	Distributive Education (CETA)	WI
7.	Fashion Merchandising	MS
8.	Food Distribution	MS
9.	Food Marketing	OH
10.	Forest Products Distribution	WA
11.	General Merchandising (CETA)	WI
12.	Home Furnishings	WI
13.	Hotel-Motel-Restaurant	MI
14.	Insurance Technology	MI
15.	Jewelry Service and Sales	WI
16.	Marketing-Communications	WI
17.	Marketing-Materials Management	WI
18.	Marketing-Transportation and Distribution	WI
19.	Property Management/Real Estate	OH
20.	Real Estate	WI
21.	Real Estate Technology	MI
22.	Recreational Services	OH

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Distribution (continued)

Course/Program Title	State
23. Retail Cashier Sales Specialist (CETA)	WI
24. Retail Merchandising (CETA)	WI
25. Retail Sales	MS
26. Retailing	HI
27. Supermarket Training	MI

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Health

	Course/Program Title	State
1.	Biomedical Equipment Technology	MS
2.	Clinical Lab. Asst.	PA
3.	Dental Assistant	MS
4.	Dental Assistant	WI
5.	Dental Assistant Equivalency (Short Term)	WI
6.	Dietary Technician	ME
7.	Dietetic Technician	MI
8.	Dietetic Technology	IN
9.	Emergency Medical	OH
10.	Emergency Medical-Paramedic	OH
11.	Geriatric Care Specialist	WI
12.	Medical Assistant	IN
13.	Medical Assistant	MS
14.	Medical Assisting	OH
15.	Medical Laboratory	OH
16.	Medical Lab Technician	MS
17.	Medical Lab. Tech	PA
18.	Medical Records Technician	MS
19.	Medical Records Technology	MS
20.	Nurse	MS
21.	Nurse, Practical	MS
22.	Nursing	SC
23.	Nursing Assistant (CETA)	WI

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Health (continued)

Course/Program Title		State
24.	Nursing-Technical	WI
25.	Occ.-Physical Therapy Asst.	ME
26.	Operating Room Assistant	MI
27.	Optical Laboratory Mechanics	WI
28.	Optometric Technician	WI
29.	Pharmacy Technical Aide	WI
30.	Physical Therapy Assisting	OH
31.	Radiologic Technician	MS
32.	Radiologic Technologist	IN
33.	Respiratory Therapy	MI
34.	Respiratory Therapy Technician	ME
35.	Respiratory Therapy Technician	OH
36.	Surgical Assisting	OH
37.	Surgical Technician	MS

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Office

Course/Program Title	State
1. Accounting	HI
2. Accounting	OH
3. Accounting, Intermediate	AZ
4. Accounting Systems Technology	PA
5. Accounting Technology	MS
6. Accounting Technology	IN
7. Bank Teller	WA
8. Banking	HI
9. Banking and Finance	IN
10. Banking & Finance	MS
12. Business Law	AZ
13. Business Mgt.	OH
14. Business Occupations Training (CETA)	WI
15. Business Tech.-Gen. Business	WA
16. Clerical Skills (CETA)	WI
17. Clerical/Stenography	HI
18. Clerical/Typing	HI
19. Clerk Steno (CETA)	WI
20. Clerk-Typist (CETA)	WI
21. Communications Technology	WI
22. Communications/Word Processing Specialist	WA
23. Computer Program Technology	IN

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Office (continued)

Course/Program Title	State
24. Computer Science	IN
25. Computer Technology	IN
26. Credit Union	TI
27. Court Reporting	SC
28. Data Processing	MS
29. Data Processing	OH
30. Finance	HI
31. Finance	WI
32. 34 Week Financial Assistant Training (CETA)	WI
33. General Business & Accounting	MS
34. Intensive Business & Office	MS
35. Keypunch Operator (CETA)	WI
36. Legal Aide	MS
37. Legal Asst.	WA
38. Legal Assisting	OH
39. Legal Secretary	MS
40. Librarianship	SC
41. Library Media Technology	PA
42. Manufacturing Supervision	IN
43. Medical Secretary	MS
44. Open Ended Clerical (CETA)	WI
45. Principles of Bank Operation	AZ

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Office (continued)

Course/Program Title	State
46. Secretarial	OH
47. Secretarial Science	HI
48. Secretarial Science	MS
49. Secretarial Science-Legal	WI
50. Security Administration	OH
51. Shorthand Court Reporting	IN
52. Small Business and Office Management	IN
53. Small Business Operations (CETA)	WI
54. Stenoscript	AZ
55. Supervision & Management	MS
56. Supervision & Management Technology	MS
57. Supervisors' Management	WI
58. Supervisory Mgt.	HI
59. Word Processing	WI

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-78

Program Area: Technical, Trades & Industry

Course/Program Title	State
1. Air Conditioning & Refrigeration	MS
2. Animal Technician	MS
3. Appliance Servicing	WI
4. Appliance Servicing (CETA)	WI
5. Architectural Drafting Technology	IN
6. Auto Body Repair	MS
7. Auto Body Repair	WI
8. Auto Machinist	MS
9. Auto Mechanics	MS
10. Auto Parts Counterman	MS
11. Auto Systems Servicing (CETA)	WI
12. Automotive Body	PA
13. Automotive Body Repair Technology	IN
14. Automotive Mechanic/Technician	WI
15. Automotive Mechanics	HI
16. Automotive Service Management Tech.	IN
17. Automotive Service Technology	IN
18. Automotive Specialties (Short Term)	WI
19. Aviation Mngt. (non traditional)	MS
20. Aviation Mechanics	MS
21. Barbering	MS
22. Basic Machine Tool Operator (CETA)	WS

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
23. Biomedical Equipment Technology	WI
24. Boat Building	WI
25. Building Construction	MS
26. Building Construction	PA
27. Building Construction Management	MS
28. Building Construction Technology	IN
29. Building Maintenance, General (CETA)	WI
30. Building Trades	MS
31. Carpentry	MS
32. CATV Installation and Repair (CETA)	WI
33. Civil Engineering	MS
34. Civil Technology-Public Work	WI
35. Code Enforcement	ME
36. Combination Welder (CETA)	WI
37. Commercial Art	WI
38. Commercial Art	WI
39. Commercial Art (Technical Specialty)	WI
40. Commercial Design	MS
41. Commercial Fishing	ME
42. Commercial and Industrial Photography	IN
43. Commercial Truck Driver	MS
44. Corrections Science	WI
45. Cosmetology	MS

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
46. Cosmetology	WI
47. Criminology	IN
48. Diesel Equipment Mechanic	WI
49. Diesel Mechanics	MS
50. Diesel Power Technology	IN
51. Diesel Service	PA
52. Digital Electronic Equipment Repair (Vocational Specialty)	WI
53. Drafting and Design	MS
54. Drafting/Design	OH
55. Drinking Water Supply	MS
56. Electric Motor Repair	MS
57. Electric Motor Repair	WI
58. Electrical Technology	MS
59. Electronic Equipment Servicing	WI
60. Electronic Servicing	MS
61. Electronics	MS
62. Electronics	OH
63. Electronics Technology	IN
64. Electro-Mechanical Technician	WI
65. Elevator Installation & Maintenance	WI
66. Energy Management	MS
67. Fire Science	MS
68. Food Dispensing Equipment Tech.	WA

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
69. Foundryworker - General (CETA)	WI
70. Fuel Injection Specialist	MS
71. Furniture & Carpentry Construction	AZ
72. General Aviation Flight Technology	IN
73. Graphic Arts	MS
74. Gunsmithing	WI
75. Heating, A/C , & Refrigeration Tech.	IN
76. Heavy Equipment Mechanic	ME
77. Heavy Equipment Mechanics	MS
78. Heavy Equipment Operator	MS
79. HEM Hydraulics-Pneumatics Program	ME
80. Histotechnology	WI
81. Horology	MS
82. Human/Community Service	WA
83. Industrial	MS
84. Industrial Drafting	MS
85. Industrial Electronics Servicing	WI
86. Industrial Electrical Wiring	MS
87. Industrial Engineering Technician	WI
88. Industrial Laboratory	OH
89. Industrial Maintenance Mechanics	MS
90. Industrial Safety	WI
91. Industrial Maintenance Technology	IN

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
92. Inside Machinist	HI
93. Institute of Management	SC
94. Industrial Skills Orientation (CETA)	WI
95. Interior Design Technology	IN
96. Land Surveyor Aide (CETA)	WI
97. Landscape Construction and Contracting Technology	WI
98. Landscape Management	WI
99. Laser Technician	WI
100. Law Enforcement	MS
102. Machine Shop	MS
103. Major Appliance Repair	MS
104. Manufacturing	OH
105. Marine Electrical	MS
106. Marine Finishing (Paint)	ME
107. Marine Machinist	HI
108. Marine Mechanics	ME
109. Marine Pipefitter	HI
110. Marine Wireman (CETA)	WI
112. Masonry	MS
113. Materials Testing	WA
114. Mechanical	MS
115. Mechanical Drafting (CETA)	WI

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
116. Mechanical Engineering	SC
117. Media Technology	MS
118. Corrections Science	WI
119. Mortuary Science	MS
120. Nuclear Radiation Technology	MS
121. Office Machine Repair	MS
123. Offset Printing	MS
124. Outside Machinist Helper (CETA)	WI
125. Packing	IN
126. Parts Counterman	WI
127. Pipefitting Math Workshop	AZ
128. Piano Tuning & Repair	WI
129. Plumbing & Pipefitting	MS
130. Pollution Treatment Technology	IN
131. Precision/Materials Inspection	WI
132. Production Machine Operator (CETA)	WI
133. Production Machine Operator-Combination Welder (CETA)	WI
134. Production Sewing (CETA)	WI
135. Program Mgt.	AZ
136. Quality Control	IN
137. Radio & TV Repair	MS
138. Recreation Vehicle and Equipment Repair	WI

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
139. Riverboat Training	MS
140. Safety/Risk Management	OH
141. Sewing Machine Repair	MS
142. Science and Engineering Technology	WI
143. Sheet Metal Trades	MS
144. Shipfitter's Helper (CETA)	WI
145. Small Engine Repair	MS
146. Stained Glass	AZ
147. Technical Study	OH
148. Tool & Die Making	MS
149. Upholstery	MS
150. Vending Equipment Maintenance & Repair	WI
151. Welder-Combination (CETA)	WI
152. Welder Helper (CETA)	WI
153. Welding	MS
154. Welding (CETA)	WI
155. Welding Technology	IN

APPENDIX E-2 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Fiscal Year 1977-1978

Program Area: Other

	Course/Program Title	State
1.	Alternative Career Education (Appleton) (CETA)	WI
2.	Chemical Dependence	AZ
3.	Counseling the Chemically Dependent	AZ
4.	Counseling the Elderly	AZ
5.	Employability Training (CETA)	WI
6.	Employer-Employee Relations	AZ
7.	Group Process	AZ
8.	Historic Preservation	WI
9.	Horsemanship	AZ
10.	Industrial Psychology	AZ
11.	Labor-Management Relations	AZ
12.	Labor Studies	OH
13.	Models for Growth	AZ
14.	Orientation to Work (CETA)	WI
15.	Paralegal Education	MS
16.	Pre-Vocational Training (CETA)	WI
17.	Psy. of Abnormality	AZ
18.	Radio Broadcasting	MS
19.	Social Justice	HI
20.	Special Education Associate	WI
21.	Theatre	IN
22.	Certificate in Women's Studies	IN

APPENDIX E-3

Recently Adopted and Projected Occupational Programs in Post-secondary Schools 1978 - 1979

Program Area: Agriculture

Course/Program Title	State
1. Agricultural Business	VA
2. Agriculture Mechanics (option)	WA
3. Agronomy	VA
4. Animal Husbandry	VA
5. Animal Science	VA
6. Crop Production	WI
7. Dairy Herd Management	WI
8. Farm Business Management	WI
9. Farm Operation and Management	VA
10. Farmstead Mechanization-Material Handling	WI
11. Forest Harvesting & Processing	WA
12. Forestry	VA
13. Horse and Livestock Management	VA
14. Horticulture	VA
15. Horticulture and Landscape Maintenance	WI
16. Landscape Laborer	HI
17. Livestock	VA
18. Natural Resources Mgmt. and Security	VA
19. Nursery Operation and Management	WA
20. Wildlife	VA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Distribution

Course/Program Title	State
1. Advertising	IL
2. Distributive Management	IL
3. General Retail Merchandising	VA
4. Hospitality Management	WI
5. Hotel-Motel Management	IN
6. Hotel-Motel Management	VA
7. Hotel-Motel Management (option)	WA
8. Life Insurance Underwriter	WI
9. Marketing Assistant	WA
10. Marketing and Sales	WA
11. Marketing Technology	IN
12. Merchandising	VA
13. Real Estate	IL
14. Real Estate	VA
15. Recreation Leadership	VA
16. Recreation and Parks	VA
17. Retail Clerk (Alternate)	WA
18. Retailing/Merchandising	IL
19. Salesmanship	VA
20. Supermarket Management	VA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Distribution (continued)

Course/Program Title	State
21. Traffic and Transportation	VA
22. Travel Agent (Short term)	WI
23. Travel and Tourism	VA
24. Wholesale Distribution	IL

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Health

	Course/Program Title	State
1.	Adult Basic Education for Health Care Clients	WI
2.	Bio-Medical Tech.	IL
3.	Dental Assistant	[illegible]
4.	Dental Assisting	VA
5.	Dental Hygiene	VA
6.	Dental Hygienist	PA
7.	Dental Laboratory	VA
8.	Dietetic Assistant	VA
9.	Dietetics	VA
10.	Emergency Medical Services	VA
11.	Geriatric Tech.	WA
12.	Gerontological Aide	IL
13.	Health Technology	VA
14.	Health Technology Assistant	VA
15.	Home Health Aide (Short term)	WI
16.	Inhalation Therapy	IL
17.	Medical Assisting	VA
18.	Medical Laboratory	VA
19.	Medical Laboratory Assistant	VA
20.	Medical Records	VA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Health (continued)

Course/Program Title	State
21. Mental Health	IL
22. Mental Health	VA
23. Mental Health Practitioner (option)	WA
24. Nuclear Medical Tech.	IL
25. Nurse's Aide	WA
26. Nursing	VA
27. Nursing Assistant	VA
28. Nursing Home Administrator	WA
29. Nursing, Practical	IL
30. Nursing, Practical	VA
31. Nursing, R. N.	IL
32. Opticianry	VA
33. Paramedic	IL
34. Physical Therapy	VA
35. Radiology	VA
36. Renal Dialysis Tech.	IL
37. Respiratory Therapy	VA
38. Respiratory Therapy Technician	VA
39. School Health Aide (Short term)	WI
40. Therapeutic Aide	IL

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Consumer & Homemaking, Occupational Preparation

Course/Program Title	State
1. Child Care	IL
2. Child Care	VA
3. Commercial Cooking & Food Mgt.	WA
4. Consumer/Family Manager	WI
5. Early Childhood Development Asst.	VA
6. Early Childhood Education	WA
7. Early Childhood Education	IN
8. Executive Housekeeping	VA
9. Family Life Education	IN
10. Food Service Management	IL
11. Food Service Management	VA
12. Home Economics	IL
13. Home Furnishings Asst.	WI
14. Homemaker Aide CETA	WI
15. Hotel-Restaurant-Institutional Management	VA
16. Institutional Management	IL
17. Interior Design & Merchandising	WA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Office

	Course/Program Title	State
1.	Accounting	IL
2.	Accounting	VA
3.	Accounting Asst. (option - Income Tax Acct.)	WA
4.	Admin. Supv. Mgt./Business Supv.	IL
5.	Auxiliary Equipment Operator	VA
6.	Banking	IL
7.	Banking	VA
8.	Banking and Finance	VA
9.	Banking and Finance	IN
10.	Bookkeeping	VA
11.	Business Administration	VA
12.	Business Careers	VA
13.	Business Occupations Training Program CETA	WI
14.	Clerical Studies	VA
15.	Clerk-Stenographer	VA
16.	Computer/Machine Operations	VA
17.	Computer Operator (option)	WA
18.	Computer Programming Technology	IN
19.	Copy Center Operator CETA	WI
20.	Court and Conference Reporting	VA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Office (continued)

Course/Program Title	State
21. Court Reporter	IL
22. Data Processing	VA
23. Educational Media	IL
24. Educational Secretary	VA
25. Financial Services Assistant	WI
26. General Business	VA
27. Intermediate Accounting	AZ
28. Key Punch Operator	IL
29. Legal Assistant	VA
30. Legal Assistant	WI
31. Legal Secretary	IL
32. Machine Shorthand (option)	WA
33. Medical Secretary	WA
34. Mid-Management	IL
35. Office Administration and Management	VA
36. Office Management	VA
37. Office Management and Procedures	AZ
38. Personnel Tech.	WA
39. Public Administration	IL
40. Public Administration Assistant	VA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: ~~Office (continued)~~

Course/Program Title	State
41. Records Management	VA
42. Report Writing	AZ
43. Savings and Loan	IL
44. School Administration	IN
45. Secretarial Science	HI
46. Secretarial Science	VA
47. Security Administration	VA
48. Small Business Management	IL
49. Small Business & Office Management	IN
50. Stenography	HI
51. Stenography	IL
52. Supervisors Management	WI
53. Survey of Data Processing	AZ
54. Typing Review	AZ
55. Typist CETA	WI
56. Word Processing Operator	IL

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Technical, Trades & Industry

	Course/Program Title		State
1.	A/C, Refrigeration, & Heating		IL
2.	Air Conditioning and Refrigeration		VA
3.	Air Traffic Control		VA
4.	Appliance Servicing		VA
5.	Architectural Drafting		IL
6.	Architectural Drafting		VA
7.	Arts and Crafts Technology		VA
8.	Auto Body Mechanics		VA
9.	Auto Body Repair		IL
10.	Auto Diagnosis and Tune-Up		VA
11.	Auto Mechanic		WI
12.	Auto Service		IL
13.	Auto Systems Servicing	CETA	WI
14.	Automotive Analysis and Repair		VA
15.	Automotive Electrical Technician		VA
16.	Automotive Machinist		VA
17.	Automotive Parts Merchandising		VA
18.	Automotive Service Assistant	CETA	WI
19.	Aviation Administration		VA
20.	Building Construction		VA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
21. Building & Grounds Maintenance	WA
22. Business and Industrial Supervision	VA
23. Cabinet Making	VA
24. Carpentry	VA
25. Chemical Technology	IL
26. Civil Engineering	VA
27. Civil Engineering	IL
28. Commercial Art	VA
29. Community and Social Service	VA
30. Conservation & Environmental Studies	IN
31. Construction Inspection	VA
32. Construction Mgt. Technology	IL
33. Corrections	VA
34. Correction Science	WI
35. Cosmetology	VA
36. Cosmetology	IL
37. Crafts	VA
38. Custom Saddle Making	WA
39. Diesel Engine Specialist & Diesel Power Mechanic	IL
40. Diesel Mechanics	VA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
41. Drafting	VA
42. Drafting and Design	VA
43. Drafting Technology	IL
44. Electrical/Electronics	VA
45. Electricity	VA
46. Electricity/Electronics Instrumentation	VA
47. Electromechanical Tech.	IL
48. Electronic Service	IL
49. Electronic Servicing	WI
50. Electronics	VA
51. Electronics Servicing	VA
52. Engineering, General	VA
53. Engineering Technical Assistant	VA
54. Environmental Control Operator	VA
55. Environmental Operations	VA
56. Fire Science Technology	IL
57. Fire Science Technology	IN
58. Firefighting	VA
59. Flight Attendant	VA
60. Funeral Services	VA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
61. Graphic Arts	VA
62. Ground Water Resources	VA
63. Ground Water Technology	VA
64. Heavy Duty Mechanic	IL
65. Heavy Equipment Maintenance	WA
66. Industrial Maintenance	IL
67. Industrial Maintenance	IN
68. Industrial Maintenance	VA
69. Industrial Maintenance Technology	IN
70. Industrial Management	VA
71. Industrial Production Supervision	VA
72. Industrial Safety and Health Technology	IN
73. Industrial Safety/OSHA	IL
74. Industrial Supervision	IL
75. Instrument Service Tech.	IL
76. Instrumentation	VA
77. Law Enforcement	VA
78. Legal Technology	IL
79. Logging Technician	WA
80. Machine Operations	VA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
81. Machine Shop	VA
82. Machine Tool	VA
83. Machine Tool Operations	VA
84. Machine Tool Opr./Machinist	IL
85. Machine Tooling Technician	WI
86. Maintenance CETA	WI
87. Management Development	VA
88. Marine Maintenance Mechanic	VA
89. Marine Science	VA
90. Mechanical Design	VA
91. Mechanical Drafting	IL
92. Mechanical Engineering Tech.	WA
93. Mechanical & Engineering Tech.	IL
94. Media Advertising Arts	VA
95. Metallurgy	IL
96. Mine Machinery Maintenance	VA
97. Mine Tech. and Supervision	VA
98. Motorcycle Maintenance	VA
99. Nuclear	VA
100. Occupational Safety and Health	VA

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
101. Photography	IL
102. Piano Technology	IL
103. Plumbing	VA
104. Police Recruit School (Short term)	WI
105. Pollution Treatment	IN
106. Pollution Treatment Technology	IN
107. Powerplant	IL
108. Printing	VA
109. Printing Technology	IN
110. Production Machine Operator CETA	WI
111. Production Welding CETA	WI
112. Radio/TV Manufacturing and Servicing	VA
113. Recreational Vehicle Repair	IL
114. Replacement Parts Specialist	WI
115. Science Technician Aide	VA
116. Security, Industrial	IL
117. Shipfitter's Helper CETA	WI
118. Small Engine and Chassis Mechanic	WI
119. Small Engines	IL
120. Solar Energy Technology	IL

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
121. Surface Mining Technology	IL
122. Surveying	IL
123. Technical Illustration	VA
124. Turf & Landscape	IL
125. Urban-Regional Planning and Development	VA
126. Vending Machine Service	VA
127. Wastewater Control	IL
128. Wastewater Treatment	VA
129. Water Control	IL
130. Welder CETA	WI
131. Welder Helper CETA	WI
132. Welding	VA
133. Welding Technology	IN
134. Welding-Pre-Vocational CETA	WI

APPENDIX E-3 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

1978 - 1979

Program Area: Other

Course/Program Title	State
1. African Studies	IN
2. Alcoholism Counseling	WA
3. Applied Arts/Fine Arts	IL
4. Applied Chemistry & Physics	AZ
5. Applied Music	VA
6. Art Education	VA
7. Broadcasting	VA
8. Communications & Broadcasting	IL
9. Communication Patterns: Problems of the Bilingual Child	AZ
10. Education	VA
11. Educational Assistant	IN
12. Emotionally Disturbed	IN
13. Ethnic and Cultural Studies Minor	IN
14. Fine Arts	VA
15. General Studies	VA
16. Handicapped Students: Career Exploration through Mini Courses at high school level CETA	WI
17. Hearing Impaired (Teaching Area) Minor Endorsement	IN
18. Human Development Specialist - Developmentally Disabled	VA

APPENDIX E-4

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Current

Program Area: Agriculture

Course/Program Title	State
1. Plant and Soil Technology	ME
2. Power & Machinery, Agricultural	ME
3. Wood Harvesting	ME

APPENDIX E-4 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Current

Program Area: Consumer & Homemaking, Occupation Preparation

Course/Program Title	State
1. Culinary Arts	ME

APPENDIX E-4 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Current

Program Area: Distribution

Course/Program Title	State
1. Distribution & Marketing	ME
2. Wholesale Distribution Management	FL

APPENDIX E-4 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Current

Program Area: Health

Course/Program Title	State
1. Bio-Medical Technician	FL
2. Gerontology	FL
3. Health Assistant	ME
4. Inhalation Therapy Technician	ME
5. Medical Lab Technology	ME
6. Nuclear Medicine	FL
7. Nursing, Practical	ME
8. Radiologic Technology	ME
9. Ultrasound	FL

APPENDIX E-4 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Current

Program Area: Office

Course/Program Title	State
1. Accounting	ME
2. Business Administration	ME
3. Computer Programming, Jr.	ME
4. Data Processing	WI
5. Data Processing Technology	WI
6. Secretarial and Related	ME

APPENDIX E-4 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Current

Program Area: Technical, Trade & Industry

	Course/Program Title	State
1.	Air Conditioning, Heat	ME
2.	Architectural Drafting Technology	WI
3.	Architectural Engineering Technology	WI
4.	Architectural Technology	WI
5.	Auto Body Repair	ME
6.	Auto Mechanics	ME
7.	Aviation Maintenance	WI
8.	Carpentry	ME
9.	Carpentry, Boat	ME
10.	Chemical Engineering Technology	WI
11.	Chemical Technology	WI
12.	Civil Engineering Technology	WI
13.	Construction & Maintenance Trades	ME
14.	Construction & Maintenance Trades, Diesel	ME
15.	Construction Trades, H.C.	ME
16.	Corrections Systems Specialist	MA
17.	Diesel Service Mechanic	ME
18.	Domestic Home Construction	ME
19.	Drafting	ME
20.	Electrical/Electronic Engineering Tech.	WI

APPENDIX E-4 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Current

Program Area: Technical, Trade & Industry (continued)

Course/Program Title	State
21. Electrical Engineering Technology	WI
22. Electrical Technology	ME
23. Electricity	ME
24. Electromechanical Engineering Technology	WI
25. Electromechanical Technology	ME
26. Electronics Technology	ME
27. Energy Conservation & Generation	FL
28. Energy Systems Specialist	MA
29. Environmental Control	ME
30. Fire Science Technology	NE
31. Fire Technology and Administration	WI
32. Fishery Education	FL
33. Graphic Arts	ME
34. Graphic Communications Technology	WI
35. Human Service Technology	FL
36. Industrial Drafting Technol ogy	WI
37. Industrial Electricity	ME
38. Industrial Electronics	WI
39. Industrial Management Technology	WI
40. Laser Technology Program	NM

APPENDIX E-4 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Current

Program Area: Technical, Trade & Industry (continued)

Course/Program Title	State
41. Law Enforcement Technology	ME
42. Machine Tool	ME
43. Manufacturing Engineering Technology	WI
44. Marine Technology	ME
45. Masonry	ME
46. Materials Engineering Technology	WI
47. Mechanical Engineering Technology	WI
48. Mine Maintenance Technology Program	NM
49. Nuclear Engineering Technology	WI
50. Pest Control	FL
51. Plumbing and Heating	ME
52. Plumbing & Pipefitting	ME
53. Postal Service Management	FL
54. Oceanographic Technology	ME
55. Sheet Metal	ME
56. Structural Steel Fabrication Technology	FL
57. Structural Technology	ME
58. Surveying Technology	WI
59. Water & Wastewater Technology	ME
60. Welding	ME

APPENDIX E-4 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Current

Program Area: Other

Course/Program Title	State
1. Deafness Communication Program	MA
2. Language Communication Assistant Program	MA
3. Prevocational	ME
4. Radio & TV	ME

APPENDIX E-5

Recently Adopted and Projected Occupational Programs in Post-secondary Schools Projected

Program Area: Agriculture

Course/Program Title	State
1. Agricultural Business Technology	WI
2. Agriculture Business	IL
3. Agricultural Science	WI
4. Animal Health Technician	CT
5. Farm Training	IL
6. Floriculture	IL
7. Forest Management Technology	WI
8. Greenhouse/Nursery Mgt.	IL
9. Horticulture	IL
10. Horticulture	WI
11. Horticulture Business Technology	WI
12. Landscape Management	WI
13. Poultry & Livestock Technology	WI
14. Timber Harvesting	IL

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Projected

Program Area: Consumer & Homemaking, Occupational Preparation

Course/Program Title	State
1. Child Care Worker	WI
2. Early Childhood Associate	WI
3. Food Preparation & Service	IL
4. Food Preparation Specialist	WI
5. Food Service Management	WI
6. Short Order Cook	IL

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Projected

Program Area: Distribution

Course/Program Title	State
1. Business/Supermarket Mgt.	IL
2. Fashion Merchandising & Marketing Tech.	WI
3. Hotel/Motel	IL
4. Insurance	IL
5. Marketing and Retailing Technology	WI
6. Real Estate	IL
7. Real Estate	WI
8. Real Estate Appraisal	IL
9. Recreation Associate	WI
10. Recreational Leadership	IL
11. Transportation, Commercial River	IL

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Projected

Program Area: Health

Course/Program Title	State
1. Bio-Medical Electronics Tech.	IL
2. Bio-Medical/Electronics Tech.	SC
3. Biomedical Equipment Technology	WI
4. Bio-Medical Tech.	IL
5. Dental Assistant	IL
6. Dental Laboratory Technology	WI
7. Dietary Technician	IL
8. Emergency Medical Science	WI
9. Geriatric Care Specialist	WI
10. Geriatric/Home Health Aide	IL
11. Health Education	IL
12. Inhalation Therapy	IL
13. Medical Laboratory Assistant	WI
14. Medical Lab. Tech.	IL
15. Medical Laboratory Technology	WI
16. Medical Office Assistant	IL
17. Medical Office Assistant	WI
18. Medical Records Tech.	IL
19. Nuclear Medical Tech.	IL
20. Nuclear Medicine Technology	WI

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Projected

Program Area: Health (continued)

Course/Program Title	State
21. Nurse Assistant	WI
22. Nursing Aide	IL
23. Nursing Options in Practical Nursing & Associate Degree Nursing	WI
24. Nursing, Practical	IL
25. Nursing, R.N.	IL
26. Operating Room Assistant	IL
27. Operating Room Technician	WI
28. Ophthalmic Lab Technician	IL
29. Paramedic	IL
30. Physical Therapy	IL
31. Physician Assistant	IL
32. Physician Assistant	WI
33. Practical Nursing	WI
34. Radiologic Technology	IL
35. Respiratory Therapy	IL
36. Respiratory Therapy	WI

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Projected

Program Area: Technical, Trades & Industry

	Course/Program Title	State
1.	Aerospace Engineering Technology	CT
2.	Air Conditioning & Refrigeration	WI
3.	A/C, Refrigeration, and Heating	IL
4.	Aircraft Pilot Training	IL
5.	Air Frame & Power Plant Mechanic	IL
6.	Apprentice Carpenter	IL
7.	Apprentice Cement Mason	IL
8.	Apprentice Ironworker	IL
9.	Architectural Technology	WI
10.	Auto Body	IL
11.	Auto Body Repair	IL
12.	Automotive Body Repair	WI
13.	Automotive Mechanic/Technician	WI
14.	Automotive Technology	CT
15.	Aviation Maintenance Management Technology	CT
16.	Aviation Tech.	IL
17.	Avionics	IL
18.	Bargeline Occupations	IL
19.	Boat Building	WI
20.	Boiler Operator	PR

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Projected

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
21. Building Codes & Enforcement	IL
22. Building Maintenance	IL
23. Carpentry & Cabinetmaking	WI
24. Chemical Operator	PR
25. Chemical Technology	IL
26. Civil Engineering Technology	CT
27. Commercial Art	WI
28. Commercial Art (Technical Specialty)	WI
29. Communications Technology	WI
30. Computer Service Technology	CT
31. Construction Mgt. Technology	IL
32. Corrections	IL
33. Cosmetology	IL
34. Cosmetology	WI
35. Criminal Justice	IL
36. Criminal Justice-Protective Serv. Tech.	WI
37. Diesel and Equipment Technology	WI
38. Diesel Mechanics	CT
39. Diesel Technologies	IL
40. Diesel Vehicle Maintenance	WI

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Projected

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
41. Digital Electronic Equipment Repair	WI
42. Drafting-Building Trades	WI
43. Drafting Design	IL
44. Drafting - Mechanical	WI
45. Electric Motor Repair	WI
46. Electrical Engineering Technology	WI
47. Electromechanical Technology	IL
48. Electromechanical Technology	WI
49. Electronic Computer Technology	IL
50. Electronic Servicing	WI
51. Electronics Communication	IL
52. Electronics Engineering Technology	WI
53. Elevator Installation & Maintenance	WI
54. Energy Conservation Technology	CT
55. Energy Resource Management	IL
56. Engineering Design Technology	CT
57. Environmental Control	IL
58. Environmental Engineering Technology	CT
59. Environmental Science Technology	CT
60. Environmental Science Technology	WI

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Projected

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
61. Farrier	IL
62. Fire Protection	IL
63. Fire Science	IL
64. Fire Science Technology	IL
65. Fishing & Related Sciences	SC
66. Flight Technology	AL
67. Foundry Technology	AL
68. Gasoline Engineering	CT
69. General Engineering Technology	CT
70. Geological Engineering Technology	CT
71. Graphic Arts	IL
72. Graphics Communication Mgt. Technology	CT
73. Graphics Communications Technology	CT
74. Gunsmithing	WI
75. Human Services Technology	WI
76. Industrial Apprentice	IL
77. Industrial Chemistry Technology	CT
78. Industrial Drafting	IL
79. Industrial Electronics Servicing	WI
80. Industrial Engineering Technology	CT

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Projected

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
81. Industrial Maintenance	IL
82. Industrial Maintenance-Electromechanical	WI
83. Industrial Management Technology	CT
84. Industrial Management Technology	WI
85. Industrial Mechanics	WI
86. Industrial Relations	IL
87. Industrial Safety	WI
88. Industrial Safety/OSHA	IL
89. Industrial Supervision	IL
90. Instructional Technology	IL
91. Instrumentation	IL
92. Instrumentation Technician	PR
93. Instrumentation Technology	WI
94. Interior Design	IL
95. Laboratory Techn ician	PR
96. Land Surveying Tech.	IL
97. Landscape Construction and Contracting	WI
98. Light Construction	WI
99. Machine Shop	CT
100. Machine Tool Opr./Machinist	IL

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Projected

Program Area: Technical, Trades & Industry (continued)

Course/Program Title		State
101.	Maintenance Mechanics	IL
102.	Marine Science Technology	SC
103.	Marine Technology	CT
104.	Masonry	WI
105.	Mechanical/Electrical Engineering Tech.	IL
106.	Mechanical Technology	IL
107.	Medical Electronics Engineering Tech.	CT
108.	Metal Work	CT
109.	Metallurgy	IL
110.	Metallurgical Technology	CT
111.	Meteorology Technology	CT
112.	Motorcycle Repair	IL
113.	Municipal Management Technology	CT
114.	Nondestructive Testing and Quality Control Technology	CT
115.	Nuclear Medicine, Bio-Medical Engr. Tech.	CT
116.	Occupational Safety & Health Technology	WI
117.	Optical Laboratory Mechanics	WI
118.	Optical Technology	IL
119.	Organ Technology	IL
120.	Parts Counterman	WI

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Projected

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
121. Photo-Jewelry Technology	CT
122. Photo Offset	IL
123. Photographic Technology	CT
124. Photography	IL
125. Piano Technology	IL
126. Piano Tuning & Repair	WI
127. Plastic Die Design	IL
128. Plastics Technology	IL
129. Plumbing & Pipefitting	WI
130. Postal Management	AL
131. Postal Service Technology	WI
132. Pottery Production	WI
133. Printing & Lithography	IL
134. Printing Management	WI
135. Production Crafts	WI
136. Production Welding	IL
137. Public Administration	IL
138. Public Service	IL
139. Quality Control Check	PR
140. Quality Control Technology	CT

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Projected

Program Area: Technical, Trades & Industry (continued)

Course/Program Title	State
141. Radio and Television Repair	CT
142. Radio/TV Service	IL
143. Recreation Vehicle and Equipment Repair	WI
144. Science and Engineering Technology	WI
145. Sheet Metal	WI
146. Small Engine and Equipment Repair	WI
147. Small Engines	IL
148. Social Worker Aide/Social Director	IL
149. Social Service Associate	WI
150. Solar Energy and Alternative Technologies	CT
151. Solar Engineering Technology	SC
152. Solar Equipment Installation	SC
153. Tool and Die Making	WI
154. Transportation & Public Utilities	IL
155. Urban Transportation Technology	CT
156. Vending Machine Maintenance	WI
157. Water and Waste-Water Control Tech.	CT
158. Welding	WI
159. Welding Technology	CT

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs in Post-secondary Schools

Projected

Program Area: Office

Course/Program Title	State
1. Accounting	IL
2. Accounting	WI
3. Banking	IL
4. Banking & Finance	WI
5. Computer Operator	IL
6. Computer Operator	WI
7. Court & Conference Reporting	IL
8. General Office Technology	WI
9. Hospital Ward Secretary	WI
10. Library Technician	AL
11. Numerical Control	IL
12. Savings & Loan	IL
13. Secretarial-Legal	WI
14. Secretarial-Medical	WI
15. Word Processing Operator	IL

APPENDIX E-5 (continued)

Recently Adopted and Projected Occupational Programs

in Post-secondary Schools

Projected

Program Area: Other

Course/Program Title	State
1. Governmental Careers	IL
2. Historic Preservation	WI
3. Journalism	IL
4. Liberal Studies	IL
5. Occupational Technology, General	WI
6. Paralegal Technology	WI
7. Pre-Drama	WI
8. Professional Entertainer	IL
9. Radio and Television Broadcasting	WI
10. Special Education Associate	WI
11. Study Skills Lab (remedial)	CT
12. Taxidermy	WI
13. Teacher Aide	WI
14. Teacher Associate	WI

APPENDIX F

NEW AND CHANGING PROGRAMS AND PRIORITIES IDENTIFIED FROM COMMUNITY COLLEGE CATALOGS AND STATE POST-SECONDARY AGENCIES

Occupational Areas	States with Programs or Priorities

Energy

Coal mining: Illinois (3); Maryland (1); Ohio (1); Utah (1)
- underground machine operator: none
- machine maintenance: Alabama (X); Virginia (1)
- mine tech & supervision: Colorado (1); Maryland (4); Tennessee (1); Virgin Islands (1)
- reclamation: none
- surface mining: Illinois (4); Indiana (1)

Nuclear: Ohio (1); S. Carolina (6); Virginia (1); Washington (1)
- technicians: New York (1); Tennessee (1)
- power plant operator: Florida (1); S. Carolina (2)
- radiation control: Mississippi (X)
- Material control handling: none
- instrumentation: none
- quality assurance & control: none

Petroleum: Colorado (1); Illinois (1); Ohio (1)
- engineering aides: none
- engineering technicians: Colorado (2); Michigan (1)

Solar: none
- technician: Colorado (1); Illinois (1)
- mechanic: none

General: none
- energy monitoring & conservation: Colorado (1)
- energy systems weatherizing: none
- climate control: Arkansas (X); Florida (3); Maine (X); Michigan (3); Ohio (4); S. Carolina (2); Virginia (2)

Legend:
"X" signifies this occupational area was identified as a state priority.
"Numbers" signify the number of programs in an occupational area identified within a state.

Occupational Areas	States with Programs or Priorities

Health

Aging: Connecticut (2); Hawaii (X); Illinois (1); Maryland (2); Massachusetts (3); Michigan (1); N. Carolina (3); Oregon (1); Virginia (1); Washington (1)

Nursing home administrator: Illinois (6); Massachusetts (1); Oregon (1)

Therapeutic recreation technician: Illinois (3); New York (1); N. Carolina (6)

Multi-competency technician: none

Diagnostic medical sonographer: Massachusetts (2)

Occupational Health and Safety

Occupational safety & health technician: Connecticut (1); Florida (3); Hawaii (X); Illinois (7); Maryland (1); Massachusetts (2); Michigan (1); New Jersey (X); N. Carolina (4); Oregon (1); Tennessee (1); Utah (1); Virginia (2)

Industrial hygiene techician: none

Industrial safety & health: Arkansas (X); Indiana (1); Michigan (1); New Jersey (X); N. Carolina (1); Oregon (1); S. Carolina (3)

Legend:

"X" signifies this occupational area was identified as a state priority.

"Numbers" signify the number of programs in an occupational area identified within a state.

APPENDIX G

NATIONAL NETWORK FOR CURRICULUM COORDINATION
IN VOCATIONAL AND TECHNICAL EDUCATION

Responses to Request for Curriculum Information

Medical Instrument Safety Technician
Dr. Richard D. Ray
Division of Vocational Education
Knott Building
State Department
Talahassee, Florida 32304 (904) 488-1839

Dr. Ed Thomas
RND Coordinator
Mississippi State University
Mississippi State, Mississippi 39762 (601) 325-2510

Multi-Competency Technician
Dr. Richard D. Ray
Division of Vocational Education
Knott Building
State Department
Talahassee, Florida 32304 (904) 488-1839

Dr. Ed Thomas
RND Coordinator
Mississippi State University
Mississippi State, Mississippi 39762 (601) 325-2510

Therapeutic Recreation Technician
Dr. Richard D. Ray
Division of Vocational Education
Knott Building
State Department
Talahassee, Florida 32304 (904) 488-1839

Therapeutic Recreation Technician cont'd
Allen Saporu
University of Illinois
Urbana, Illinois

Sonia Price
Assistant Director, Vocational Home Economics
Ohio State Department of Education, Room 912
65 South Front Street
Columbus, Ohio 43215 (614) 466-3046

Coal Mining
Mr. Talmadge L. Rushing
Department of Education
Knott Building
State Department
Talahassee, Florida 32304 (904) 488-4901

Mr. D. W. Drewes
Project Director, CONSERVA
401 Oberlin Road
Raleigh, North Carolina (919) 488-4901

Fred Harrington
American Technical Society
Chicago, Illinois (304) 348-7880

Nuclear Energy Technicians
Mr. Talmadge L. Rushing
Department of Education
Knott Building
State Department
Talahassee, Florida 32304 (904) 488-4901

Petroleum Technicians
Society of Petroleum Engineers
Dallas, Texas

Mr. Les Langston
Eastern New Mexico University
Roswell Campus
Roswell, New Mexico 88201 (505) 347-5441

Mr. Myron Crumrine
Bradford Area S.D.
Bradford, Pennsylvania

Solar Technicians
Solar Energy Research
Fort Collins, Colorado 80521

Dr. Everett D. Eddington
New Mexico State University
Les Cruces, New Mexico 88003 (505) 646-1635

Dr. Curvin Smith
Associated Educational Consultants
Pittsburgh, Pennsylvania

Mr. Leon Colavita
Division of Vocational Education
and Career Preparation
New Jersey Department of Education
225 West State Street
Trenton, NJ 08625 (609) 292-1749

Energy Monitoring
Mr. William Wherton P. E.
6887 Canel Road
Fridley, Minnesota 55432 (612) 571-8555

Mr. Ben Albright
Trade and Industrial Education
Education Building
Raleigh, North Carolina 27611 (919) 733-7047

Microprocessing
Mr. Charles M. Head
Dept. of Education
Knott Building
State Department
Talahassee, Florida 32304 (904) 488-8150

David Poston
Vocational Curr. Dev. and Res. Center
P. O. Box 657
Natchitoches, Louisiana 71457 (318) 352-5348

Weatherizing
Mr. Talmadge L. Rushing
Department of Education
Knott Building
State Department
Talahassee, Florida 32304 (904) 488-4901

Weatherizing cont'd
Kazukiyc Kuboyama
Apprenticeship Program Coordinator
Honolulu Community College
974 Dillingham Boulevard
Honolulu, Hawaii 96817

Resource Recovery/Bio-mass Conversion
Dr. Richard D. Ray
Division of Vocational Education
Knott Building
State Department
Talahassee, Florida 32304 (904) 488-1839

Occupational Safety & Health Technician
Dr. Richard D. Ray
Division of Vocational Education
Knott Building
State Department
Talahassee, Florida 32304 (904) 488-1839

William Anderson
California Community Colleges
Sacramento, California

Dean Matsumura
State Dept. of Labor
925 Mililani Street
Honolulu, Hawaii 96817 (808) 845-9211

Environmental Health Assistant & Technician
Dr. Richard D. Ray
Division of Vocational Education
Knott Building
State Department
Talahassee, Florida 32304 (904) 488-1839

Veterinarian Assistant
Mr. Earl Hay
Bureau of Occupational Education
Curriculum Development
New York State Education Department
Room 327 EB, Washington Avenue
Albany, NY 12234 (518) 474-6472

Special Needs Group
Dr. Philip Edgecomb
Curriculum Laboratory
Vocational-Technical Education
Department
Building 4103 , Kilmer Campus
Rutgers University
New Brunswick, NJ 08903 (201) 932-3845

APPENDIX H

MEDICARE, MEDICAID AND HEALTH INSURANCE: BACKGROUND INFORMATION*

A substantial portion of nursing home providers' and hospitals' revenue is derived from the federal government's Medicare program for the aged and chronically disabled, state governments' Medicaid programs for the medically indigent, and Blue Cross and other private insurance carriers.

Blue Cross is a prepaid health care program that provides its subscribers with hospital benefits through numerous independent plans that vary from state to state. Pursuant to contracts, the Company's hospitals are paid directly by local Blue Cross organizations on a basis agreed to be each hospital and Blue Cross. In Alabama, Colorado, Kansas, Mississippi and Virginia, Blue Cross payments are made pursuant to a formula based on the hospital's costs. In all other states, hospitals are paid on the basis of established charges or rates negotiated with Blue Cross, which generally are 97% to 100% of established charges. Other private insurance carriers reimburse their policyholders or make direct payments to the hospital on the basis of the particular hospital's established charges.

Medicare is a federal program that provides to persons age 65 and over and some disabled persons certain hospital and medical insurance benefits, which include hospitalization benefits for up to 90 days per incident of illness plus a lifetime reserve aggregating 60 days. Medicaid is a federal-state medical assistance program administered by the states whereby hospital benefits are available to the medically indigent.

Medicare and Medicaid programs make payments to the hospitals in amounts equal to the lesser of the hospital's billed charges or cost plus a pre-tax return on equity which currently approximates 10.5% (equity excludes assets and liabilities not related to patient care, as defined by Medicare regulations). Generally, newly-constructed hospitals may carry forward certain nonreimbursed costs for five years and under certain conditions recover all or a part of such costs. All hospitals under construction are intended to be constructed to comply with the physical standards required for Medicare and Medicaid certification.

---

*Source: Humana Inc. 1977 Annual Report. Louisville, Kentucky: Humana Inc., November 1977, p. 4-5.

Amounts received under Medicare, Medicaid and some Blue Cross programs are generally less than the hospital's billed charges for the services covered. Patients are generally not responsible for any difference between normal hospital charges and amounts reimbursed under Medicare, Medicaid and certain Blue Cross programs for such services, but are responsible to the extent of any deductible or co-insurance features of their coverage.

Within the statutory framework of the Medicare and Medicaid programs, there are substantial areas subject to administrative rulings, interpretations and discretion which may affect payments made under either or both programs. In addition, the federal or state governments might in the future reduce the funds available under such programs or require more stringent utilization of hospital facilities.

APPENDIX I

GOVERNMENT REGULATION OF LONG TERM
HEALTH CARE: AN HISTORICAL OVERVIEW*

Hospital operations are subject to federal, state and local government regulation generally regarding fitness and adequacy of the hospital, its equipment, personnel and standards of medical care. Hospitals are subject to periodic inspections by state licensing agencies.

In 1972, Public Law 92-603 was enacted by Congress. This law contains numerous provisions which affect the scope of Medicare coverage and the basis for reimbursement of Medicare providers. Among other things, the statute provides that Medicare reimbursement may be denied with respect to return on equity, depreciation, interest on borrowed funds and other expenses in connection with capital expenditures which have not received prior approval by a designated state health planning agency if such expenditures exceed $100,000, change bed capacity, or substantially change the services of a facility. Additionally, an increasing number of states have enacted, or have under consideration, legislation requiring certificates of need as a prior condition to hospital construction, expansion, or introduction of major new services.

Public Law 93-641 entitled the National Health Planning and Resources Development Act of 1974, became effective early in 1975. This law and regulations thereunder establish a coordinated system of regional and state health planning agencies to develop plans for the distribution of health care services, to administer required state certificate of need laws, to contain health care costs and to meet the national priorities established by the Act. The Department of Health, Education and Welfare recently announced its intention to propose changes in existing regulations concerning bed need formulas, which, if adopted, would reduce the number of new and replacement hospital beds that could be constructed in the future.

Several states have adopted hospital rate review legislation which generally provides that a state commission must review and approve the rates for various hospital services. Except for Colorado, no state has adopted rate review legislation. It is expected that federal and state involvement in and regulation of hospitals and health care will continue to increase in the future.

---

*Source: Humana Inc. 1977 Annual Report. Louisville, Kentucky: Humana Inc., November 1977, p. 5-6.

The President has submitted to the Congress a bill entitled "The Hospital Cost Containment Act of 1977" which contains a formula limiting increases in revenues for inpatient services from all sources. Humane Inc., a private hospital company estimates that, in general, the formula would limit inpatient revenue increases to approximately 9% during the first year of the proposed legislation and gradually declining amounts in subsequent years. New hospitals would be excluded from coverage until they are two years old. The legislation also proposes a limit on new capital expenditures by hospitals. Another proposed bill, "The Medicare and Medicaid Administrative and Reimbursement Reform Act," among other things, proposes to modify Medicare and Medicaid cost-based reimbursement programs to provide increased returns for hospitals whose costs are lower than the average for similar hospitals and restrict reimbursement for hospitals whose costs significantly exceed the group average. Committee hearings have been held on both bills in the Senate and the House of Representatives. In addition, several alternative proposals for controlling health care costs have been drafted. These proposals range from amendments to the President's bill to completely new approaches to the situation. These new proposals are in various stages of review in both Houses of Congress. No bills concerning health care costs have come to the floor of either House for a vote. In addition, other proposals for the control of health care costs and proposals providing for the adoption of national health insurance coverage have been considered by Congress from time to time. At the present, it is not possible to predict whether such legislation will be adopted, or the form in which it might be adopted and accordingly, hospitals are unable to assess the effect of any such legislation on its business.

The Fair Labor Standards Act was recently amended to increase the federal minimum wage from $2.30 per hour to $2.65 per hour on January 1, 1978, to $2.90 per hour on January 1, 1979, to $3.10 on January 1, 1980 and to $3.35 per hour on January 1, 1981. Hospital providers have a significant number of employees whose earnings will be affected by such increases in the minimum wage.

Regulations under Public Law 92-603, the implementation of certain portions of which have been enjoined by a federal court, provide that admissions and utilization of facilities by Medicare and Medicaid patients must be reviewed in order to insure efficient utilization of facilities and services. The law and regulations also require Professional Standards Review Organizations ("PSRO's") to be designated by July 1, 1978 to review the need for hospitalization and utilization of hospital services and to set standards for patient care. The Company is unable at this time to determine the effect of PSRO's on its future operations. However, in accordance with the Company's policy, a quality assurance program has been instituted in each of the Company's hospitals which, among other things, provides for utilization review and retrospective patient care evaluation.

APPENDIX J

CONTINUING EDUCATION OF LONG TERM HEALTH CARE PERSONNEL*

This essay is the product of a work group that met during the special task force on long term health care.

Concepts. The first issue is to ascertain the needs of individuals in long term care settings and the role expectations skills or individual competencies necessary to provide for these needs. Based on this determination the continuing education needs for maintaining skills or updating skills can be planned. In looking at the role skills necessary for personnel in long term care it is important to acknowledge that long term care usually implies a major change in lifestyle for the patient. Often, the sense of loss of independence which brings a patient to the long term care system, requires new daily living habits, relating to others and new patterns of coping, all of which can be traumatic. Since we are often dealing with a "care taking" role rather than a curative role, it is particularly important that skills in communication between staff and patient are taught to all personnel.

A second issue is the perceived needs for continuing education versus the actual needs. Some methods of assessment are necessary to determine actual needs among staff and to provide programs which address these actual needs. It is recognized that the educational methodology to conduct this assessment is available.

A third issue is the concept of interdisciplinary team practice in the long term care setting. Simply stated, the interdisciplinary approach is collaboration among the health care staff, patients, and the patients' family, sharing information through open communication to decrease duplication of effort thereby increasing efficiency, defining specific realistic goals and objectives for patient outcomes, and management of interpersonal and

---

* Project staff wishes to thank Thomas D. Aschenbrener, Bureau of Health Manpower, U.S. Department of Health, Education and Welfare for summarizing the task force work group on this topic. The ideas expressed in this appendix reflect his views and those of the group assembled, and are not necessarily in accord with the positions of any organization or agency.

interprofessional conflict. This is not to be confused with the multidisciplinary approach in health care which usually is characterized by the relative isolation of each individual in the provision of health services. The interdisciplinary health provider team has attained specific skills, attitudes and knowledge of their specific discipline and also of those skills, attitudes and knowledge which promote discussion and decision making in an open, non-threatening climate. Clearly, the payoff for promoting such an approach is:

1. The patient is viewed from a total or holistic perspective, where the social and psychological components are considered in relation to the physical/medical symptoms or dysfunction.

2. Health professionals can integrate their observations and skills into the total health care approach.

3. All members of the team (including the patient) have agreed upon priorities and goal for the treatment regime.

4. Patients and families have realistic expectations for therapeutic outcomes.

5. Health care profits from decreased wasteful duplication.

A fourth concept in long term care is that the continuing education should be made available to and geared to those staff members most involved in direct patient care. This means that the greatest amount of continuing education should be provided to the aides and orderlies.

Purpose. Continuing education can be used for a number of purposes in the long term care setting. The obvious reason is for skill maintenance and updating. Another purpose is to prevent "burn-out" of employees. Burn-out is a result of unmanaged personal and professional frustration, which leads to difficulty in communication between the staff person and the patient and often results in disregard for patient needs. This problem occurs frequently in long term care and contributes to the high turnover in personnel. Thus, burn-out can be usually dealt with effectively through continuing education by creating opportunities to adequately vent frustration, resolve conflicts, and receive support

from the workgroup. Continuing education can also be used as an opportunity to provide status to lower paid employees. This mechanism will allow for increased recognition of the importance of these services, both by the aides and orderlies themselves and by their peer group and the senior staff persons. This will also provide a mechanism for the the aides and orderlies to share their observations and suggestions for improving patient care and working conditions. This opportunity for patient care skills learning, as well as communication should promote the quality of care delivered by these personnel and encourage their retention in the work setting.

A fourth purpose of continuing education activities is for trainer training. Many long term care facilities have in-service-trainers who are requesting additional information and educational modules on patient care, effective instructional techniques for LTC personnel, and team building skills development. Trainer training in all of these areas can be addressed through continuing education programs.

Resources. Continuing education can foc s on all professional levels, however, it is important to keep in mind that the educational principles are the same regardless of the depth of content involved. Continuing education materials and workshops, especially for the aides and orderlies level of health worker, can be effectively initiated through vocational and technical schools, junior colleges, professional associations, and consortia of schools as well as private educational organizations. These sources can also be of significant assistance through the development of curriculum models for health workers. Methods of disseminating these models for replication and testing are of great importance and should be addressed by supervisors and administrators in long term care as well as professional organizations. While the need for such continuing education is considered essential for the successful operation of quality patient care, the major difficulty remains in finding financial resources to initiate and continue such programs.

Topics for future consideration. Some of the major topic areas for continuing education that need to be addressed in LTC from the interdisciplinary, humanistic approach are:

1. Changes in the long term care setting and the impact on continuity of care.

2. Handicapped persons in the long term care setting.

3. Attitudes among long term care personnel.

4. Role of long term care worker as "caretaker" rather than "healer".

5. Administrative skills--managing work, supervising employees, use of homemaker/home health aides and other community support services.

6. "Care taking" as a function of responding to patient's requests.

In conclusion, the workgroup emphasized that continuing education should be stressed in the long term care setting as a means to facilitate good patient care. The continuing education should be presented in the work setting as often as possible. Finally, the greatest amount of continuing education should be available to and promoted for those who have the greatest amount of patient contact.

APPENDIX K

RECOGNIZED ACCREDITING AGENCIES FOR ALLIED HEALTH EDUCATION*

BLOOD BANK TECHNOLOGY
Programs for the specialist in blood bank technology
Committee on Allied Health Education and Accreditation, American Medical Association, in cooperation with the Committee on Education, American Association of Blood Banks
John E. Beckley PhD, Secretary
Committee on Allied Health Education and Accreditation (CAHEA), AMA
535 North Dearborn Street
Chicago, Illinois 60610
1974/1978

CYTOTECHNOLOGY
Programs for the cytotechnologist
Committee on Allied Health Education and Accreditation (CAHEA), American Medical Association, in cooperation with the Cytotechnology Programs Review Committee, American Society of Cytology
John E. Beckley, PhD
(as above)
1974/1978

HISTOLOGIC TECHNOLOGY
Programs for the histologic technician
Committee on Allied Health Education and Accreditation (CAHEA), American Medical Association, in cooperation with the National Accrediting Agency for Clinical Laboratory Sciences, which is sponsored by the American Society for Medical Technology and the American Society of Clinical Pathologists
John E. Beckley, PhD
(as above)
1974/1978

LABORATORY ASSISTANT EDUCATION
Programs for the laboratory assistant
Committee on Allied Health Education and Accreditation (CAHEA), American Medical Association, in cooperation with the National Accrediting Agency for Clinical Laboratory Sciences, which is sponsored by the American Society for Medical Technology and the American Society of Clinical Pathologists
John E. Beckley
(as above)
1974/1976/1978

---

*Excerpts from the Current List of Nationally Recognized Accrediting Agencies and Associations by the Accreditation and Institutional Eligibility Staff, U.S. Department of Health, Education and Welfare, Office of Education, Bureau of Postsecondary Education; June, 1975.

MEDICAL ASSISTANT EDUCATION
One- and two-year medical assistant programs
CAHEA, American Medical Association, in cooperation with the Curriculum Review Board, American Association of Medical Assistants
John E. Beckley
(as above)
1974/1976/1980

MEDICAL LABORATORY TECHNICIAN
Programs for the medical laboratory technician
CAHEA, American Medical Association, in cooperation with the National Accrediting Agency for Clinical Laboratory Sciences, which is sponsored by the American Society for Medical Technology and the American Society of Clinical Pathologists
John E. Beckley
(as above)
1974/1976/1978

MEDICAL RECORD EDUCATION
Programs for the medical record administrator and medical record technician
CAHEA, American Medical Association, in cooperation with the Education and Registration Committee, American Medical Record Association
John E. Beckley
(as above)
1952/1975/1978

MEDICAL TECHNOLOGY
Professional programs
CAHEA, American Medical Association, in cooperation with the National Accrediting Agency for Clinical Laboratory Sciences, which is sponsored by the American Society for Medical Technology and the American Society of Clinical Pathologists
John E. Beckley
(as above)
1952/1974/1978

NUCLEAR MEDICINE TECHNOLOGY
Programs for the nuclear medicine technologist
CAHEA, American Medical Association, in cooperation with the Joint Review Committee on Educational Programs in Nuclear Medicine Technology, which is sponsored by the American College of Radiology, American Society of Clinical Pathologists, American Society for Medical Technology, American Society of Radiologic Technologists, and the Society of Nuclear Medicine
John E. Beckley
(as above)
1974/1976/1978

OCCUPATIONAL THERAPY
Professional programs
CAHEA, American Medical Association, in cooperation with the Accreditation Committee, American Occupational Therapy Association
John E. Beckley
(as above)
1952/1975/1978

PHYSICAL THERAPY
Professional programs
CAHEA, American Medical Association, in cooperation with the Review Committee for Physical Therapy Education
John E. Beckley
(as above)
1952/1976/1977

PHYSICIAN'S ASSISTANT EDUCATION
Programs for the assistant to the primary care physician and the surgeon's assistant
CAHEA, American Medical Association, in cooperation with the Joint Review Committee on Educational Programs for Physician's Assistants, which is sponsored by the American Academy of Family Physicians, American Academy of Pediatrics, American College of Physicians, American College of Surgeons, and the American Society of Internal Medicine
John E. Beckley
(as above)
1974/1978

RADIOLOGIC TECHNOLOGY
Programs for the radiologic technologist and radiation therapy technologist
CAHEA, American Medical Association, in cooperation with the Joint Review Committee on Education in Radiologic Technology, which is sponsored by the American Society of Radiologic Technologists and the American College of Radiology
John E. Beckley (as above) 1957/1975/1978

RESPIRATORY THERAPY
Programs for the respiratory therapist and respiratory therapy technician
CAHEA, American Medical Association, in cooperation with the Joint Review Committee for Respiratory Therapy Education, which is sponsored by the American Association for Respiratory Therapy Education, American College of Chest Physicians, American Society of Anesthesiologists and the American Thoracic Society
John E. Beckley
(as above)
1974/1978

OTHER HEALTH-RELATED, RECOGNIZED AGENCIES

BLIND AND VISUALLY HANDICAPPED EDUCATION
Specialized schools for the blind and visually handicapped
National Accreditation Council for Agencies Serving the Blind and Visually Handicapped
Richard W. Bleecker, Executive Director
79 Madison Avenue
New York, New York 10016
1971/1976/1980

DENTAL AND DENTAL AUXILIARY PROGRAMS
Programs leading to the DDS and DMD degrees, advanced dental specialty programs, general practice residency programs and programs in dental hygiene, dental assisting, and dental technology
American Dental Association
Thomas J. Ginley, Secretary
Commission on Accreditation of Dental and Dental Auxiliary Programs, ADA
211 East Chicago Avenue
Chicago, Illinois 60611
1952/1972/1977

DIETETICS
Coordinated undergraduate programs in dietetics and dietetic internships
American Dietetic Association
Gloria Archer, Coordinator
Program Evaluation, ADA
430 North Michigan Avenue
Chicago, Illinois 60611
1974/1976/1977

MEDICINE
Programs leading to the M.D. degree
Liaison Committee on Medical Education, representing the Council on Medical Education, American Medical Association, and the Executive Council, Association of American Medical Colleges
(in odd-numbered years, after July 1)
Richard L. Egan, Secretary
Council on Medical Education, AMA
535 North Dearborn Street
Chicago, Illinois 60610
and
(in even-numbered years, after July 1)
John A. D. Cooper, President
Association of American Medical Colleges
One Dupont Circle, N.W., Suite 200
Washington, D.C. 20036
1952/1972/1977

NURSING

Professional schools of nurse anesthesia

American Association of Nurse Anesthetists
Edward L. Kaleita, Executive Staff Secretary
Council on Accreditation, AANA
111 East Wacker Drive, Suite 929
Chicago, Illinois 60601
1955/1976/1979

Practical nurse programs

National Association for Practical Nurse Education Service, Inc.
Lucille L. Etheridge, Executive Director
122 East 42nd Street
New York, New York 10017
1967/1976/1980

Professional, technical and practical nurse programs

National League for Nursing, Inc.
Margaret E. Walsh, General Director and Secretary
10 Columbus Circle
New York, New York 10019
1952/1975/1979

OCCUPATIONAL, TRADE AND TECHNICAL EDUCATION

Private trade and technical schools

National Association of Trade and Technical Schools
William A. Goddard, Secretary
Accrediting Commission, NATTS
2021 L Street, N.W.
Washington, D.C. 20036
1967/1976/1978

OSTEOPATHIC MEDICINE

Programs leading to the D.O. degree

American Osteopathic Association
Philip Pumerantz, Director
Office of Osteopathic Education,
AOA 212 East Ohio Street
Chicago, Illinois 60611
1952/1976/1978

PHARMACY

Professional schools

American Council on Pharmaceutical Education
Daniel A. Nona, Executive Director
One East Wacker Drive
Chicago, Illinois 60601
1952/1973/1977

PODIATRY
Professional and graduate degree porgrams and podiatric assistant training programs
American Podiatry Association
John L. Beanett, Director
Council on Podiatry Eduation, APA
20 Chevy Chase Circle, N.W.
Washington, D.C. 20015
1952/1975/1978

PUBLIC HEALTH
Graduate schools of public health
Council on Education for Public Health
Janet A. Strauss, Executive Director
1015 18th Street, N.W.
Washington, D.C. 20036
1974/1975/1977

SPEECH PATHOLOGY AND AUDIOLOGY
Master's degree programs
American Speech and Hearing Association
Noel D. Matkin, Chairman
Education and Training Board, ASHA
9030 Old Georgetown Road
Washington, D.C. 20014
1967/1976/1979

APPENDIX L

EDUCATION OPPORTUNITIES IN INDUSTRIAL HYGIENE*

Technician Programs

Berkeley-Charleston-Dorchester
Technical Education Center
P.O. Box 10367
North Charleston, NC 29411

Chattanooga State Technical Institute
Chattanooga, TN 37406

Chesterfield-Marlboro Technical
Education Center
Cheraw, SC 29520

Clark County Community College
Las Vegas, NV 89114

Cleveland County Technical Institute
Shelby, NC 28150

Delgado College
New Orleans, LA 70119

Detroit Institute of Technology
Detroit, MI 48201

Ferris State College
Big Rapids, MI 49307

Haskell Indian Junior College
P.O. Box 91
Lawrence, KS 66044

Manhattan College
Bronx, NY 10471

Merritt College
Oakland, CA 94619

Miami-Dade Community College
Miami, FL 33167

Midlands Technical Education Center
Columbia, SC 29250

Montgomery College
Takoma Park, MD 20012

Mt. Hood Community College
Gresham, OR 97030

Mt. San Antonio College
Walnut, CA 91789

North Shore Community College
Beverly, MA 01915

Northeastern Christian Junior College
Villanova, PA 19085

Northern Virginia Community College
Bailey's Crossroads, VA 22041

Oklahoma State University
Stillwater, OK 74074

Quincy College
Quincy, IL 62301

Rowan Technical Institute
Salisbury, NC 28144

Salem College
Salem, WV 26426

Southern Technical Institute
Marietta, GA 30060

Texas State Technical Institute
Waco, TX 76705

Thomas Nelson Community College
Hampton, VA 23366

Tri-County Technical Education Center
P.O. Box 87
Pendleton, SC 29670

University of New Haven
West Haven, CT 06516

Vincennes University
Vincennes, IN 47591

Western Wisconsin Technical Institute
LaCrosse, WI 54601

Williamsport Area Community College
Williamsport, PA 17701

*The following are known to offer assorted courses or a two-year certificate program in technician training; or four-year curricula and graduate degrees for the industrial hygienist. A list of schools offering programs in all occupational safety and health specializations is available from William J. Weis III, Manpower Officer, National Institute for Occupational Safety and Health, 4676 Columbia Parkway, Cincinnati, OH 45226.

Undergraduate Degree Programs

University of California at Los Angeles
Los Angeles, CA 90032

Central Missouri State University
Warrensburg, MO 64093

Colorado State University
Fort Collins, CO 80521

Detroit Institute of Technology
Detroit, MI 48201

Ferris State College
Big Rapids, MI 49307

Johns Hopkins University
Baltimore, MD 21205

Montana College of Mineral
Science and Technology
Butte, MT 59701

Oklahoma State University
Stillwater, OK 74074

Quinnipiac College
Hamden, CT 06518

Texas A&M University
College Station, TX 77843

Texas Tech University
P.O. Box 4130
Lubbock, TX 79409

University of Miami
Coral Gables, FL 33124

University of Washington
Seattle, WA 98195

Graduate Degree Programs

Central Missouri State University
Warrensburg, MO 64093

Harvard University
Boston, MA 02115

New York University
New York, NY 10016

Northwestern University
Evanston, IL 60201

Texas A&M University
College Station, TX 77843

Texas Tech University
P.O. Box 4130
Lubbock, TX 79409

University of California at Berkeley
Berkeley, CA 94720

University of Cincinnati
Cincinnati, OH 45221

University of Illinois
Chicago, IL 60680

University of Iowa
Oakdale, IA 52319

University of Michigan
Ann Arbor, MI 48109

University of Minnesota
Minneapolis, MN 55455

University of North Carolina
Chapel Hill, NC 27514

University of Oklahoma
Oklahoma City, OK 74104

University of Pittsburgh
Pittsburgh, PA 15313

University of Texas
Houston, TX 77025

Wayne State University
Detroit, MI 48226

EXISTING TRAINING PROGRAMS OF DIAGNOSTIC MEDICAL ULTRASOUND 1977

Name and Location of School	Director	Length of Program	Student Capacity	Tuition	Classes Begin	College Credits Awarded	B-scan Units	Cardiac Units	Real-Time Units
ALABAMA									
University of Southern Alabama College of Medicine Dept. of Radiology P.O. Box 8095 Mobile, Alabama 36608	Arvin Robinson, M.D. Marveen Craig, RDMS	3 mo. 1 mo. 1 mo. 1 mo. 1 mo. 1 mo. 1 mo.	4	yes	Jan. Apr. May July Sept. Oct. Nov.	Cont' Educ. Cred.	3		1
CALIFORNIA									
Bay General Community Hospital 480 4th Avenue Chula Vista, Calif. 92010	W. Michael Asher, M.D. Kenneth Albertson, M.D.	6 mo.	1	yes	Jan. Apr. Jul. Oct.	no	2	1	1
French Hospital and Medical Clinic 1911 Johnson Ave. Box F San Luis Obispo, Calif. 93406	Marie Nyssen, R.T.	1 yr.	2	yes	Jan.	no	1		
Huntington Memorial Hospital 100 Congress St. Pasadena, California	T.G. Allen, M.D.	1 yr	1	no	July	no	1		
Loma Linda University Division of Diagnostic Ultrasound Loma Linda, Calif 92354	Ernest Carlson, M.D.	1 yr.	4	yes	Sept.	yes	4		

Name and Location of School	Director	Length of Program	Student Capacity	Tuition	Classes Begin	College Credits Awarded	B-scan Units	Cardiac Units	Real-Time Units
CALIFORNIA									
Martin Luther King, Jr. General Hosp. 12021 S. Wilmington Ave. Los Angeles, Calif. 90059	Cyrus Broumand, M.D.	1 yr.	2	yes	Jan. July	NO	2		
Omnimedical Services, INC. P.O. Box 1277 Paramount, Calif. 90723	James Steffems, M.D.	1 yr.	variable	yes	variable	NO	?		
Santa Barbara Cottage Hospital Dept of Ultrasound Pueblo at Bath Street Santa Barbara, Calif. 93105	Hector Rodreguez, M.D.	1 yr.	1	no	Jan.	NO	1		
Univ. of Calif. Los Angeles Hosp. Dept. of Ultrasound Los Angeles, Calif. 90024	W.F. Sample, M.D.	1 yr.	1	no	July	NO	4		
Univ. of Calif. at San Francisco Hosp. Dept. of Ultrasound 3rd and Parnassus San Francisco, Calif. 94143	Roy A. Filly, M.D. Linda McKay-London, RDMS	1 yr.	1	yes	March Sept.	YES	3		1
V.A. Wadsworth Hospital Center Wilshire and Sawtelle Blvds. Los Angeles, Calif. 90073	M.A. Winston, M.D.	1 yr.	3	no	July	NO	4		
V.A. Hospital of San Diego Division of Ultrasound 3550 La Jolla Village Dr. San Diego, Calif. 92161	Barbara Gosink, M.D.	1 yr.	1	no	Oct. April	NO	2		

Name and Location of School	Director	Length of Program	Student Capacity	Tuition	Classes Begin	College Credits Awarded	B-scan Units	Cardiac Units	Real-Time Unit
COLORADO									
Univ. of Colorado Medical Center Dept. of Ultrasound 4200 E. Ninth Ave. Denver, Colorado 80220	Joseph Holmes, M.D.	1 yr.	9	yes	Sept	NO	10		
CONNECTICUT									
Yale University School of Medicine Department of Ultrasound 333 Cedar St. New Haven, Conn. 06510	Ken Taylor, M.D.	1 yr.	4	yes	Jan. April July Oct.	NO	3		
FLORIDA									
Florida Medical Center Department of Ultrasound 5000 W. Oakland Park Blvd. Lauderdale Lakes, Fla. 33313	Michael Raskin, M.D. Peter Vining, R.T.	1 yr.	4	yes	August	NO	1	1	
Mt. Sinai Hospital 4300 Alton Rd. Miami, Florida 32504	M. Viamonte, M.D.	1 yr.	2	yes	June	NO	2		
West Florida Hospital 8383 North Davis Highway Pensacola, Florida 32504	Mike Foss, RDMS	1 yr.	6	yes	Jan. May Sept.	YES	3		
ILLINOIS									
Northwest Community Hospital 800 W. Central Rd. Arlington Heights, Ill. 60005	Jerome A. Roy, M.D.	1 yr.	2	no	Jan.	NO	1		

Name and Location of School	Director	Length of Program	Student Capacity	Tuition	Classes Begin	College Credits Awarded	B-scan Units	Cardiac Units	Real Time Units
INDIANA									
Methodist Hospital of Gary, Inc. 600 Grant St. Gary, Indiana 46402	Rochele Siner, R.T.	1 yr.	6	yes	June	YES	1		
KANSAS									
University of Kansas Hospital Dept. of Ultrasound 39th and Rainbow Kansas City, Kansas 66103	Nabil F. Maklad, M.D. Karen Templeton, RDMS,R.T.	1 yr.	2	no	June	NO	4		
MARYLAND									
Maryland Institute of Ultrasound 1444 Westway Air S.W. Baltimore, Maryland	Roy Soares, RDMS Roger Sanders, M.D.	1 yr.	7	yes	Sept.	NO	12	10	
MAINE									
Maine Medical Center 22 Bramhall St. Portland, Maine 04102	Irving Selvage, Jr., M.D.	1 yr.	2	yes	Jan. July	NO	1		
MASSACHUSETTS									
Middlesex Community College Springs Road Bedford, Massachesetts 01730	John H. Britt, R.T.	1 yr.	15	yes	Sept.	YES	16		

Name and Location of School	Director	Length of Program	Student Capacity	Tuition	Classes Begin	College Credits Awarded	B-scan Units	Cardiac Units	Real-Time Units
MICHIGAN									
Henry Ford Hospital 2799 W. Grand Blvd. Detroit, Michigan 48202	Nick Stefani, R.T.	1 yr.	4	yes	Jan. July	NO	2		
Oakwood Hospital Dept. of Ultrasound 18101 Oakwood Blvd. Dearborn, Michigan 48124	Allen Hennessey, M.D. Denise Skowron, R.T.	1 yr.	2	no	Jan. July	NO	2		
Providence Hospital 16001 W. 9 Mile Rd Southfield, Mich. 48034	James Karo, M.D.	1 yr.	2	yes	Jan.	NO	3		
NEW YORK									
The New York Hospital Cornell Medical Center Dept. of Radiology 525 E. 68th St. New York, New York 10021	Robert Bagler, R.T.	1 yr.	3	yes	Sept.	NO	3		
The New York Radiological Institute 145 W. 58th St. New York, New York 10019	Arthur Kaplowitz, B.S.,R.T.	1 yr.	12	yes	Feb. June Oct.	NO	12		
State University of New York Downstate Medical Center 450 Clarkson Ave. Brooklyn, New York 11203	Mimi Berman Clinical Coordinator	1 yr.	6	yes	June	YES	6		

Name and Location of School	Director	Length of Program	Student Capacity	Tuition	Classes Begin	College Credits Awarded	B-scan Units	Cardiac Units
PENNSYLVANIA								
Hospital of the Univ. of Pennsylvania Dept. of Ultrasound 3400 Spruce St. Philadelphia, Pa 19104	Peter Arger, M.D.	1 yr.	2	no	Sept.	NO	3	
Westmoreland Hospital Dept. of Ultrasound 532 W. Pittsburg St. Greensburg, Pa. 15601	W. Daniel Foster, M.D. Jocelyn Champagne, RDMS	1 yr.	2	yes	Jan. July	NO	1	1
WASHINGTON								
School of Science and Engineering Seattle University c/o Joan P. Baker Seattle, Washington 98122	Joan P. Baker, MSR, RDMS	5 yr.*		yes	Sept.	*this is a B.S. program with an internship prog. in Ultra.		
Swedish Hospital and Medical Center Dept. of Ultasound 1211 Marion St. Seattle, Wa. 98104	John Denney, M.D. Mary Aufleger	1 yr.	2	no	variable	NO	1	
WISCONSIN								
St. Mary's Hospital Dept. of Nuclear Medicine 2320 N. Lake Dr. Milwaukee, Wisconsin	James Roberts	1 yr.	2	yes	Jan. July	NO	2	

Name and Location of School	Director	Length of Program	Student Capacity	Tuition	Classes Begin	College Credits Awarded	B-scan Units	Cardiac Units	Real-Time Units
NEW YORK									
Upstate Medical Center Hospital Dept. of Radiology Syracuse, New York 13210	John Marangola, M.D.	1 yr.	1	no	Sept.	NO	[illegible]		
OHIO									
Aultman Hospital Dept. of Ultrasound 2600 6th St. S.W. Canton, Ohio 44710	Samuel Hissong, M.D. Susan Hunter, RDMS,R.T.	6 mo.	2	no	Jan. July	NO	1		
Mt. Sinai Hospital of Cleveland Dept. of Ultrasound University Circle Cleveland, Ohio 44106	Michael J. Flynn,.Ph.D.	1 yr.	2	no	variable	NO	2		
OKLAHOMA									
University of Oklahoma Dept. of Rad. Sciences Section of Ultrasound P.O. Box 26901 Oklahoma City, Okla. 73190	Ross E. Brown, M.D.	1 yr.	12	yes	Aug. Jan.	YES	2		
PENNSYLVANIA									
Jefferson University Medical Center Curtis Clinic 1015 Walnut Philadelphia, Pa. 19107	Barry B. Goldberg, M.D. Sandra Hagen-Ansert, B.A.	1 yr.	6	yes	Jan. July	NO	4	3	2

Name and Location of School	Director	Length of Program	Student Capacity	Tuition	Classes Begin	College Credits Awarded	B-scan Units	Cardiac Units	Real-Time Units
CANADA									
Health Sciences Center Dept. of Ultrasound 700 Wm. Ave. Winipeg, Manitoba R3E 0Z3	Ted Lyons, M.D.	1 yr.	4	no	Sept. Jan.	NO	3		

APPENDIX M (continued)

Pending Ultrasound Training Programs

The following institutions have not implemented training programs as of yet, but have shown interest.

Broward General Medical Center
1600 S. Andrews Avenue
Fort Lauderdale, Florida 33316
ATT: J.E. Hutlas, Jr. A.S.R.T.
Assist. Rad. Administrator

Broward Community College
3601 Johnson Street
Hollywood, Florida 33021
ATT: Mrs. S. Frazier, R.T.
Department Head

Indiana University School of Medicine
1100 W. Michigan Street
Indanapolis, Indiana 46202
ATT: Suetta Kehrein, M.S., R.T.

Manhattan College
Manhattan College Parkway
Department of Rad. and Health Sciences
Hayden Hall, Room 206
Riverdale, New York 10471
ATT: Leonard O'Connor, Ph.D.
Chairperson of the Department

Richland Memorial Hospital
3301 Harden Street
Columbia, South Carolina 29203
ATT: David Adcock, M.D.
Director, Dept. of Nuc. Med.

St. Joseph's Hospital
350 W. Thomas Road
Phoenix, Arizona 85013
ATT: Kathy Kaul
Supervisor, Ultrasound

University of Texas Health Science Center
Dept. of Radiology
5323 Harry Heinz Blvd.
Dallas, Texas 75235
ATT: John Roberts
Instructor of Radiology

Other Ultrasound Training Programs

The following institutions have implemented programs for training in Ultrasound that are basic introductory courses.

Bowman Gray School of Medicine
Dept. of Ultrasound
Winston-Salem, N. Carolina
ATT: James F. Martin, M.D.

Triton College
2000 5th Avenue
Rivergrove, Illinois 60170
ATT: Marri Benetazzo
Assoc. Dir. Allied Health
Cont. Ed. & Learning Resources Center

Southern Nevada Memorial Hospital
1800 W. Carleston
Las Vegas, Nevada
ATT: Anthony M. Marlon, M.D.
Edward J. Quinn, M.D.

(Echocardiography only)

University Hospital
Cardiac Investigation Unit
London, Ontario, Canada

Montreal General Hospital
Dept. of Radiology
Section of Ultrasound
Montreal, Quebec, Canada
ATT: Fred Winsberg, M.D.

Manhattan College
Depart. of Radiological Sciences
Riverdale, New York 10471
ATT: C. Leonard O'Connor, Ph.D.

University of Southern Alabama Medical Center
Department of Radiology
Mobile, Alabama 36608
ATT: Marveen Craig

APPENDIX N

VOCATIONAL/TECHNICAL SCHOOLS/
COURSES RELATED TO SOLAR ENERGY*

California

CENTER FOR EMPLOYMENT TRAINING 425 South Market Street San Jose CA 95113 Attn: Rudolph Rodriguez	Offer two weeks of solar training (build solar collectors & install them) as part of a 6-week course in "Building Maintenance."
Industrial Technical Department CHAFFEY COMMUNITY COLLEGE 5885 Haven Avenue Alta Loma CA 91701 Attn: Dean of Occupational Services	Offer "Solar Energy I"-introduction to solar heating & cooling systems; and "Solar Energy II" construction & installation of solar energy devices.
Civil/Mechanical Engineering Technology COGSWELL COLLEGE 600 Stockton Street San Francisco CA 94108	Offer "Solar Energy Applications" workshop for designers, builders, etc. on design & contruction of sun & wind-powered systems.
COLLEGE OF THE REDWOODS Eureka CA 95501 Attn: Industrial Technology Dept.	Offer "Solar Heating Systems" course on design & construction of active solar systems - for vocational/technical majors.
ENERGY SYSTEMS INC. 4570 Alvarado Canyon Road San Diego CA 92120	Offer solar energy training course - originally developed for their dealers & installers as a hands-on training project; now offered to others. Schedule & locations can be obtained by writing ESI. Fee: $135 (includes "Solar Heating" training notes); notes may be purchased separately for $8.50.
Physical Science Department LAKE TAHOE COMMUNITY COLLEGE 2659 Lake Tahoe Blvd. P.O. Box 14445 South Lake Tahoe CA 95702	Offer "Solar Energy" course which covers utilization of solar energy & mechanics of various systems.
Technical, Trade & Industrial Div. LONG BEACH CITY COLLEGE 1305 E. Pacific Coast Highway Long Beach CA 90806	Air Conditioning & Refrigeration program includes a segment on Solar Energy.
Engineering Department MT. SAN JACINTO COLLEGE 21400 Highway 79 San Jacinto CA 92383	Offer "Solar Energy Applications" course - semi-technical on applications & design of collectors.

*National Solar Heating and Cooling Information Center, Rockville, MD, April 1978.

Technology Division ORANGE COAST COLLEGE 2701 Fairview Road Costa Mesa CA 92626	Offer "Solar" course on system design & application of solar heating & cooling equipment. Planning complete program to include designing equipment, construction methods, & fabrication of solar devices.
SAN DIEGO CITY COLLEGE Air Conditioning & Refrigeration Dept. 12th & Russ Streets San Diego CA	AIR CONDITIONING & REFRIGERATION DEPT: Offer two courses in "Solar Energy Maintenance & Technology" as part of their A.S. degree program - cover installation, trouble-shooting, efficiency & cost estimating.
SAN DIEGO COUNTY CONSTRUCTION LABORERS BENEFIT FUND 4161 Home Avenue Suite 260 San Diego CA 92105 Attn: Mr. H. Thurman	Six-week training program for those who want to be construction laborers. One week spent on installation & maintenance of solar equipment. Write for application (must be 18 yrs. old & resident of San Diego County. Four-six month waiting list). For California residents outside San Diego County, write: San Diego County Construction Laborers Benefit Fund, P.O. Box 1307, Boulevard CA 92005.
Construction Technology Dept. SAN DIEGO MESA COLLEGE 7250 Mesa College Drive San Diego CA 92111	Offer "Utilization of Solar Energy" - covers types of solar equipment & laboratory.
Physics Department SAN JOAQUIN DELTA COMMUNITY COLLEGE 5151 Pacific Avenue Stockton CA 95207	Offer "Energy Conservation & Alternatives" course which includes solar energy. Plan to offer courses on "Solar & Wind Power Technology" and "Construction of Solar Elements" in the future.
SAN JOSE CITY COLLEGE Air Conditioning & Refr. Dept. 2100 Moor Park Avenue San Jose CA 95128	Offer 2-year "Solar Technician" program leading to associate degree & certificate under division of air-conditioning & refrigeration. Courses cover residential solar design & industrial solar application. Provides students with knowledge to become solar technicians.
SOLAR HEATING TECHNICIAN TRAINING SKILLS TRAINING PROGRAM Sonoma State College 1801 East Cotati Avenue Rohnert Park CA 94928 Attn: Gayla Mote (707) 664-2577	Training Program sponsored by Sonoma State College & State of California Comprehensive Employment & Training Act (C.E.T.A.) grant. Training: solar technology, climatology, energy conservation techniques, contractor licensing law, uniform mechnaical code, etc. Upon completion individual able to design, size, build & install solar systems. On-the job training included.
SOLAR TECHNICIAN TRAINING PROJECT 1322 "O" Street Sacramento CA 95814 Attn: JoAnn Trujillo, Proj. Coord. (916) 322-7190	Six-month course for installation of solar hot water systems. For low-income individuals. Sponsored by California Office of Appropriate Technology.

Colorado

COLORADO TECHNICAL COLLEGE
655 Elkton Drive
Colorado Springs CO 80907
Attn: Dr. Tom Forster
(303) 598-0200

Offer Associate in Applied Science Degree in Solar Engineering Technology. Also offer B.S. in solar engineering technology. Associate Degree (2-years) to prepare students for employment as solar technicians in research labs, test facilities, solar companies & other energy-related organizations. B.S. (4-years) to prepare students to work as solar energy engineering technologist - emphasizes mechanical engineering technology of heating, ventilating & airconditioning systems & energy conservation methods.

Delaware

Energy Conservation & Solar
Application Center
NEW CASTLE COUNTY VOCATIONAL-TECH.
SCHOOL DISTRICT
1417 Newport Road
Wilmington DE 19804

ADULT EDUCATION PROGRAM: Offer "Solar Heating of Buildings" course for practitioners in construction industry on sizing, design, installation, maintenance & economic feasibility of solar heating systems (60 hours). Fee: $360 (includes educational materials & access to computer program for economic optimization of solar heating systems).

Florida

PINELLAS VO-TECH INSTITUTE
6100 154th Avenue North
Clearwater FL 33520

Two training programs (2 evenings/week - registration every 9 wks): 1) "Solar Energy-Heating & Cooling" (mechanics, theory of building solar hot water heaters design & construction of solar airconditioning units); 2) "Household Energy Conservation/Solar Energy" (how homeowner can conserve energy; information on using solar hot water heating).

Georgia

COOSA VALLEY AREA VOC-TECH SCHOOL
112 Hemlock Avenue
Rome GA 30161

HEATING & AIRCONDITIONING DEPT: In process of developing course on solar collectors, heat storage & controls associated with domestic solar heating as part of heating & airconditioning course.

DE KALB COMMUNITY COLLEGE
495 North Indian Creek Drive
Clarkston GA 30021

In process of developing short term course in Solar Equipment Installation & Maintenance. Long range plans include solar energy as part of Heating, Air-Conditioning & Refrigeration Program. (No courses in solar offered at present - 12/77).

NORTH GEORGIA TECH & VOC SCHOOL
Lake Burton Road, Georgia 197
Clarkesville GA 30523

Planning curriculum to train technicians to install & service solar energy systems. (No courses in solar offered at present - 12/77).

SOLAR ENERGY MAY BE OFFERED AS OPTION AT FOLLOWING SCHOOLS IN GEORGIA:

ALBANY AREA VOC-TECH SCHOOL
1021 Lowe Road
Albany GA 31705

ATHENS AREA VOC-TECH SCHOOL
U.S. Highway 29 North
Athens GA 30601

AUGUSTA AREA VOC-TECH SCHOOL
2025 Lumpkin Road
Augusta GA 30904

CARROLL COUNTY AREA VOC-TECH SCHOOL
P.O. Box 548
Carrollton GA 30117

MACON AREA VOC-TECH SCHOOL
940 Forsyth Street
Macon GA 31201

MARIETTA-COBB AREA VOC-TECH SCHOOL
980 South Cobb Drive
Marietta GA 30060

MOULTRIE AREA VOC-TECH SCHOOL
P.O. Box 520
Moultrie GA 31768

PICKENS COUNTY AREA VOC-TECH SCHOOL
Burnt Mountain Road
Jasper GA 30143

SAVANNAH AREA VOC-TECH SCHOOL
214 West Bay Street
Savannah GA 31401

SWAINSBORO AREA VOC-TECH SCHOOL
201 Kite Road
Swainsboro GA 30401

THOMAS AREA VOC-TECH SCHOOL
P.O. Box 1578
Thomasville GA 31792

UPSON COUNTY AREA VOC-TECH SCHOOL
P.O. Box 1089
Thomaston GA 30286

VALDOSTA AREA VOC-TECH SCHOOL
Route 1, Box 211
Valdosta GA 31601

WALKER COUNTY AREA VOC-TECH SCHOOL
Box 454 Merry Meadow Lane
Rock Spring GA 30739

WAYCROSS-WARE CO. AREA VOC-TECH SCHOOL
1701 Carswell Avenue
Waycross GA 31501

BRUNSWICK JUNIOR COLLEGE
Vocational-Technical Program
Altama at Fourth
Brunswick GA 31520

Iowa

Trade & Industrial Occupations Div.
SCOTT COMMUNITY COLLEGE
Belmont Road
Bettendorf IA 52722

Offer Solar Energetics Technology major - Associate Degree (2 yrs). Prepares student for employment as technician in: research labs, solar energy systems installation, assistants to designers & architects, systems maintenance, other energy-related occupations. Graduate will also be proficient in heating & airconditioning, sheet metal work & all installation of domestic & industrial units.

Kentucky

WESTERN KENTUCKY UNIVERSITY
Dept. of Engineering Technology
Bowling Green KY 42101
Attn: Henry M. Healey, P.E.

Mr. Healey has prepared a 3-hr seminar "Solar Energy Applications" for hvac contractors. Covers: information & background on sizing solar systems, cost analysis techniques. Will present seminar at afternoon or evening group meetings of contractors.

Maine

PORTLAND VOCATIONAL CENTER
Portland ME 04111

Offer training in solar installation.

Massachusetts

BRISTOL COMMUNITY COLLEGE
777 Elsbree Street
Fall River MA 02720

Has been funded to set up an energy program.

Engineering Science & Industrial Related Technologies Dept.
CAPE COD COMMUNITY COLLEGE
West Barnstable MA 02668

Offer 3 solar courses: "Solar Energy I-Design & Installation Techniques for Residential Buildings" - deals with systems design, sizing & installation of solar heating units; "Solar Energy II-Design & Installation Techniques for Residential Buildings" - deals with installation & operation of solar heating systems (includes retrofit); and "Survey of Alternative Energy Sources" - discussion of various energy resources.

NEW ENGLAND FUEL INSTITUTE
Technical Training Center
390 Commonwealth Avenue
Boston MA 02215

Offer four-week (160 hour) hands-on solar heating technical training course. For those who want to learn to install solar systems. Fee: $450.

Division of Engineering Technology
SPRINGFIELD TECH COMMUNITY COLLEGE
Armory Square
Springfield MA 01105

Offer A.S. degree in Solar Energy. Graduates are qualified to install complete liquid or air solar heating systems, size systems, and evaluate cost effectiveness.

Michigan

LANSING COMMUNITY COLLEGE
Engineering Technology Department
419 North Capitol Ave.
Lansing MI 48914

Courses offered: Solar Housing (AT 200) Solar Site Seminar (AT 208) Principles of Solar Energy Collection (AT 201) Residential Solar Heating System Design (At 203) Alternate Sources of Energy (ATG 150) Building a Solar Furnace (ATG 151) Building a Solar Water Heater (ATG 152) Passive Solar Design (AT 211) Passive Solar II (AT 215)
Solar Energy Technician Program: One year certificate or two year associate degree programs are being planned.

FOLLOWING MICHIGAN SCHOOLS TO OFFER ONE SEMINAR & EIGHT-WEEK SOLAR HEATING/COOLING COURSE:

HENRY FORD COMMUNITY COLLEGE
5101 Evergreen Road
Dearborn MI 48128
Attn: SEMTAP

HIGHLAND PARK COLLEGE
Glendale & Third Streets
Highland Park MI 48203
Attn: SEMTAP

JACKSON COMMUNITY COLLEGE
2111 Emmons Road
Jackson MI 49201
Attn: SEMTAP

MACOMB COUNTY COMMUNITY COLLEGE
Division of Continuing Education
South Campus - Box 948
Warren MI 48093
Attn: SEMTAP

MICHIGAN SCHOOLS (Continued):

MONROE COUNTY COMMUNITY COLLEGE
1555 Raisinville Road
Monroe MI 48161
Attn: SEMTAP

CHARLES STEWART MOTT COMMUNITY COLLEGE
1401 East Court Street
Flint MI 48503
Attn: SEMTAP

SCHOOLCRAFT COMMUNITY COLLEGE
18600 Haggerty Road
Livonia MI 48152
Attn: SEMTAP

ST. CLAIR COMMUNITY COLLEGE
323 Erie Street
Port Huron MI 48060
Attn: SEMTAP

WASHTENAW COMMUNITY COLLEGE
Ypsilanti Center - 214 N. Huron
Ypsilanti MI 48197
Attn: SEMTAP

WAYNE COUNTY COMMUNITY COLLEGE
4612 Woodward Avenue
Detroit MI 48201
Attn: SEMTAP

MID-PLAINS COMMUNITY COLLEGE
Inter. of I-80 & Highway 83
North Platte NE 69101

Incorporate solar heating instruction in Building & Construction Dept. and Refrigeration/Airconditioning Dept. Students given introduction to solar heating as it applies to their particular field - familiarization level.

SOUTHEAST COMMUNITY COLLEGE
Milford Campus
Milford NE 68405

Airconditioning & Arch. Tech. Programs: Offer "Solar Energy"-a 32 hr. 2-quarter credit course as part of these programs. Basic course which includes brief history & basic calculations for sizing solar systems for residential structures.

Nebraska

SOME DEGREE OF SOLAR TECHNICIAN TRAINING OFFERED AT FOLLOWING SCHOOLS:

CENTRAL TECHNICAL COMMUNITY COLLEGE
P.O. Box 1024
Hastings NE 68901

METROPOLITAN TECHNICAL COMMUNITY COLLEGE
30th & Fort Streets
Omaha NE 68111

NORTHEAST TECHNICAL COMMUNITY COLLEGE
801 East Benjamin Avenue
Norfolk NE 68701

New Hampshire

NEW HAMPSHIRE VOCATIONAL-TECHNICAL COLLEGE
1066 Front Street
Manchester NH 03102

Offer Certificate program in solar system installation maintenance and repair.

New Jersey

BROOKDALE COMMUNITY COLLEGE
Lincroft NJ 07738

Solar & Wind Technology course offered.

Heating, Ventilating & Airconditioning Department ESSEX COUNTY TECHNICAL CAREERS CENTER 91 West Market Street Newark NJ	Offer a day & evening program in solar heating systems (adult education courses - certificate given) - courses cover domestic water heating & residential & commercial solar space heating & cooling systems; how to install & service systems. Day program (300 hours), evening program (120 hrs). Also planning Solar Heating course for their votech high school to be in operation late Spring '78.
MANASQUAN PUBLIC SCHOOLS Broad Street Manasquan NJ 08736	Offer Energy Education/Curriculum Development course.
Plumbing, Heating & Refrigeration MERCER COUNTY AREA VOCATIONAL TECHNICAL SCHOOLS 1085 Old Trenton Road Trenton NJ 08690	As part of curriculum have integrated knowledge & skills related to implementation and installation of solar heating and cooling units.
MIDDLESEX COUNTY COLLEGE Edison NJ 08817	Project WATTE (Workshop Approach to Teacher Training in Energy) - to assist teachers in developing courses & curriculum strategies for integrating energy education into traditional disciplines. (Workshops planned for March-May 1978).
OCEAN COUNTY VOCATIONAL TECHNICAL SCHOOLS Route 571 Jackson NJ 08527	Offer 3 solar courses: "Solar Energy Theory for Heating, Ventilating & Airconditioning Technicians."(Evening School - open to general public - evening school certificate awarded - start Fall '78 - 15 wks. Course for hvac specialists covering design considerations for solar hot water & space heating systems "Solar Energy Workshop" (Evening School - open to general public) - 21 hour program to assist homeowner in designing & installing solar hot water heating equipment - covers theory of operation, life cycle costing & installation; and "Climate Control" program (high school students only - 2 yr. high school certificate) - program for training in plumbing, heating, airconditioning & refrigeration. Students learn to design, repair & install such systems - includes new unit in design & installation of solar heating equipment.
Continuing Education Program SALEM COUNTY VOCATIONAL TECHNICAL SCHOOLS R.D. #2, Box 350 Woodstown NJ 08098	As part of Continuing Education program (nights), offer a 36-hour program - Introduction to Solar Heating - to acquaint student with current trends in use of solar energy for heating & cooling. Plumbing & Heating Trades Program - during 1977-78 school year will introduce a unit on solar energy for secondary & post-secondary students - will build a solar hot water heating systems.

New York

BROOME-DELAWARE-TIOGA BOCES Broome-Tioga Educational Center Upper Glenwood Road Binghamton NY 13905	Offer solar training as part of electronics course.
Department of Physics MOHAWK VALLEY COMMUNITY COLLEGE 1101 Sherman Drive Utica NY 13501 Attn: Dr. Francis Dunning	Offer two courses in solar: "Solar Energy & Energy Conservation" - general introductory course for homeowner on solar energy utilization; and "Solar Energy for the Heating and Airconditioning Technician which covers development of skills for the installation, maintenance & repair of solar heating & cooling systems.
NASSAU COUNTY BOCES Valentines Road & the Plains Road Westbury NY 11590	Offer solar energy technology as part of Heating/Air Conditioning courses.
SARATOGA-WARREN BOCES F. Donald Myers Occupational Center Henning Road Saratoga Springs NY 12866	Offer solar energy technology as part of Heating/Air Conditioning courses.
CAPE FEAR TECHNICAL INSTITUTE Solar Energy Educational Program 411 North Front St. Wilmington NC 28401	Evening extension program: offers Solar Energy Systems Workshop. 33 hour non-credit survey course, including laboratory demonstration of solar water and air heating. Heating, Air Conditioning and Refrigeration program: one solar energy course planned for immediate presentation. General Occupational Technology program: one-three solar energy courses planned. Solar Technology program: full two year planned for Sept., 1979.

Oregon

LINN-BENTON COMMUNITY COLLEGE Mid-Willamette Energy Information Center 6500 SW Pacific Blvd. Albany OR 97321	General Science or Engineering: Offer "Technical Projects-Solar" course - design & build projects related to construction of solar liquid & air heating systems & passive solar heated buildings; "Alternate Energy Sources" course - covers solar & wind systems, etc. Community Education: Offer "Home Energy Alternatives" course which is half on solar, and offer four solar workshops on: solar water heaters, solar air collectors, solar greenhouses & solar food dryers - workshops cover design & construction.

South Carolina

AirConditioning, Refrigeration & Heating
FLORENCE-DARLINGTON TECHNICAL COLLEGE
P.O. Drawer 8000
Florence SC 29501

Offer 2-year (7 quarter) diploma program in airconditioning, refrigeration & heating. "Solar Energy Applications" course offered as part of curriculum - covers theory & practical application of heating & airconditioning through use of solar energy & the design, installation, servicing & trouble shooting of solar heating & cooling units.

AirConditioning, Refrigeration & Heating
YORK TECHNICAL COLLEGE
U.S. 21 By-Pass
Rock Hill SC 29730

Offer 2-year (7 quarter) diploma program in airconditioning, refrigeration & heating. Beginning Spring 1978 will offer "Solar Energy Applications" course as part of curriculum - hands-on course which covers installation, service & control of collection of solar energy.

SOLAR ENERGY MAY BE OFFERED AS PART OF CURRICULA AT FOLLOWING SOUTH CAROLINA SCHOOLS:

Air Conditioning & Refrigeration
BEAUFORT TECHNICAL EDUCATION CENTER
100 S. Ribaut Road
Beaufort SC 29902

Air-Conditioning Technology
DENMARK TECHNICAL EDUCATION CENTER
Denmark SC 29042

Air Conditioning Technology
HORRY-GEORGETOWN TECHNICAL COLLEGE
P.O. Box 710
Highway 501
Conway SC 29526

Air Conditioning Technology
PIEDMONT TECHNICAL COLLEGE
Drawer 1208
Greenwood SC 29646

Air Conditioning Technology
SUMTER AREA TECHNICAL COLLEGE
506 Guignard Drive
Sumter SC 29150

Refrigeration Technology
TRIDENT TECHNICAL COLLEGE
North Campus
7000 Rivers Avenue
North Charleston SC 29406

Climate Control Technology & Refrigeration
CHESTERFIELD-MARLBORO TECHNICAL COLLEGE
Drawer 928
Cheraw SC 29520

Refrigeration Technology
GREENVILLE TECHNICAL COLLEGE
P.O. Box 5616, Station B
Greenville SC 29606

Climate Control Technology & Refrigeration
MIDLANDS TECHNICAL COLLEGE
Beltline Campus, P.O. Drawer Q
316 Beltline Blvd.
Columbia SC 29205

Air Conditioning & Refrigeration
SPARTANBURG TECHNICAL COLLEGE
P.O. Drawer 4386
Spartanburg SC 29301

Refrigeration Technology
TRI-COUNTY TECHNICAL COLLEGE
P.O. Box 87
Pendleton SC 29670

Refrigeration Technology
WILLIAMSBURG TECHNICAL, VOCATIONAL & ADULT ED. CENTER
601 Lane Road
Kingstree SC 29556

Texas

CENTRAL TEXAS COLLEGE
P.O. Box 1416
U.S. Highway 190 West
Killeen TX 76541

Offer "Solar Heating Systems" course - overview of basic components of various solar energy systems; operation, installation, maintenance, trouble-shooting & service procedures.

NAVARRO COLLEGE
Highway 31 West
Corsicana TX 75110
Attn: Charlie G. Orsak, Jr.
Director of Energy Programs

In process of developing 2-year Associate Degree Solar Technician curriculum. Should be ready for initial dissemination & pilot testing by Spring 1979.

TEXAS STATE TECHNICAL INSTITUTE
Rolling Plains Campus
Sweetwater TX 79556

Continuing Education program: 48 hour training course teaches installation, maintenance, repair techniques for residential and commercial water and space heating systems. Course includes both liquid and air type collector sub-systems.
Air Conditioning and Refrigeration Department: Plans Solar Energy Mechanic curriculum covering 16 courses in three quarters. Graduates receive certification as solar energy mechanics.

Virginia

LORD FAIRFAX COMMUNITY COLLEGE
P.O. Drawer L
Middletown VA 22645
Attn: Electronics Technology Dept.

Offer "Solar Heating & Cooling of Residential Buildings" course (ENVR 155) for contractors currently in hvac business. (one night/wk for 11 weeks). Course covers sizing, installation & maintenance of solar systems with emphasis on economics. Anticpate offering similar more advanced course for architects in the future.

Washington

NORTH SEATTLE COMMUNITY COLLEGE
9600 College Way North
Seattle WA 98103

Will offer section on solar heating as part of Environmental Control Technician/Refrigeration & Air Conditioning Design class. (start Fall '78)

Continuing Education Program
PENINSULA COLLEGE
1502 E. Lauridsen Blvd.
Port Angeles WA 98362

Offer "Solar Heating Systems for Homes" course during fall quarter each school year. Evening course for contractors & engineering technology students - to develop practical skills for sizing, installing, operating & maintaining active solar energy systems.

For more information on learning to install solar energy systems, the following reference sources may be of use:

BARRON'S GUIDE TO THE TWO-YEAR COLLEGES - lists more than 150 colleges as having programs in heating & airconditioning (climate control) technology. Courses in solar energy principles & solar thermal conversion system maintenance may be included in some cases.(available at public libraries)

STATE EMPLOYMENT COMMISSIONS - can give information on vocational schools in your state.

HIGH SCHOOL COUNSELORS - can provide information on vocational trades and schools.

JUNIOR OR COMMUNITY COLLEGES - offer courses and certificate programs in the building trades.

APPENDIX O

NUCLEAR ENERGY PROGRAMS*

New England

Hartford State Technical College
Hartford, Conn.

Wentworth Institute
Boston, Mass.

East

Altoona Campus,
Pennsylvania State University
Altoona, Pa.

Community College of Beaver County
Monaca, Pa.

Hazleton Campus,
Pennsylvania State University
Hazleton, Pa.

South

Aiken Technical Education Center
Aiken, S.C.

Central Florida Community College
Ocala, Fla.

Central Virginia Community College
Lynchburg, Va.

Chattanooga State Technical Community College
Chattanooga, Tenn.

Florence-Darlington Technical College
Florence, S.C.

---

*Source: Doggette, John R. Energy-Related Technology Programs in Community and Junior Colleges: An Analysis of Existing and Planned Programs. Oakridge, Tennessee: Oak Ridge Associated Universities, 1976.

South (continued)

Midlands Technical College
Columbia, S.C.

Roane State Community College
Harriman, Tenn.

Tri-County Technical College
Pendleton, S.C.

Midwest

Terra Technical College
Fremont, Ohio

Southwest

James Connally Campus,
Texas State Technical Institute
Waco, Texas

Rio Grande Campus,
Texas State Technical Institute
Harlingen, Texas

West

Chabot College
Hayward, Calif.

APPENDIX P

LABOR STRUCTURE IN COAL MINING*

JOB TYPES. Because the job of coal mining is done by several different methods the employment classifications are somewhat varied (Illustration 7)

Certain jobs require a specified length of experience, some also require that an individual be "certified" and/or "qualified". When these terms are used in the context of coal mining, it is important to draw a distinction between them. A certified person is one who has satisfied certain state requirements to enable him to perform certain jobs. A qualified person is one who is permitted to do certain jobs because he has satisfied federal requirements. The two terms are not mutually exclusive. However, the code of federal regulations states that certain persons are recognized as qualified, some are not. By meeting the federal requirements an individual may become "qualified" in those areas.

ORGANIZATION OF MINE

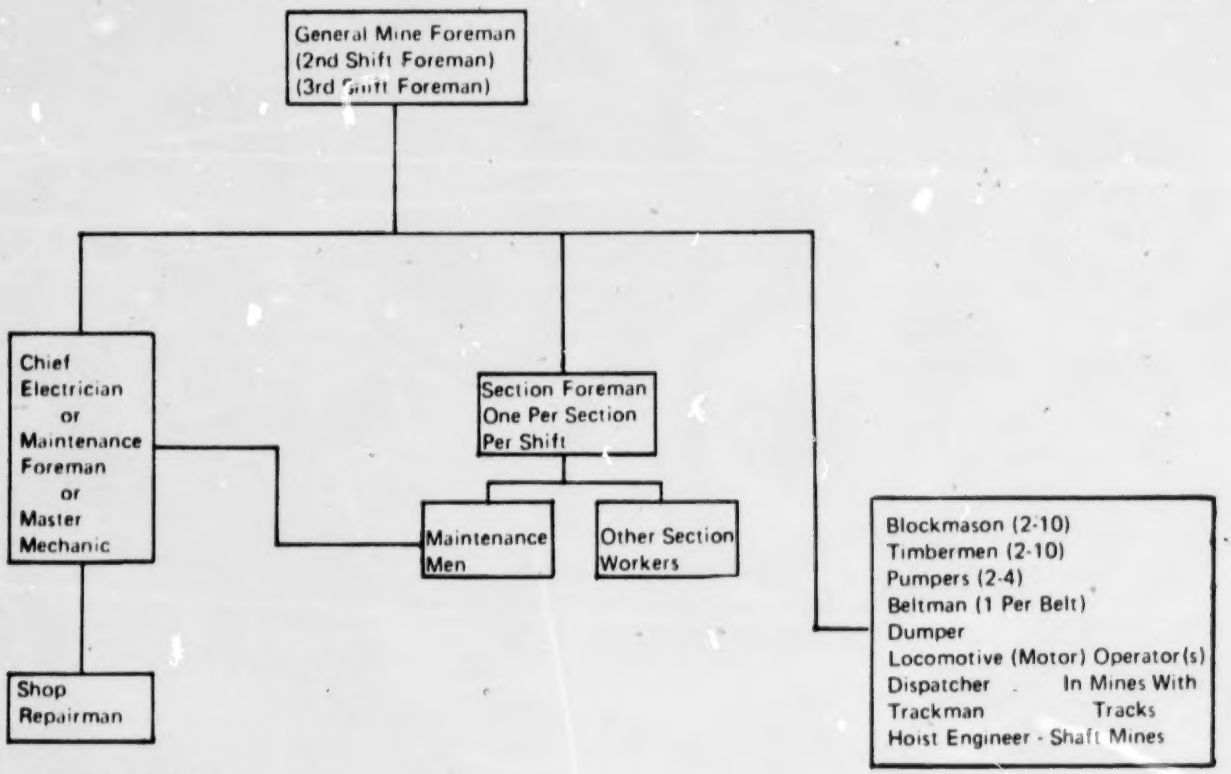
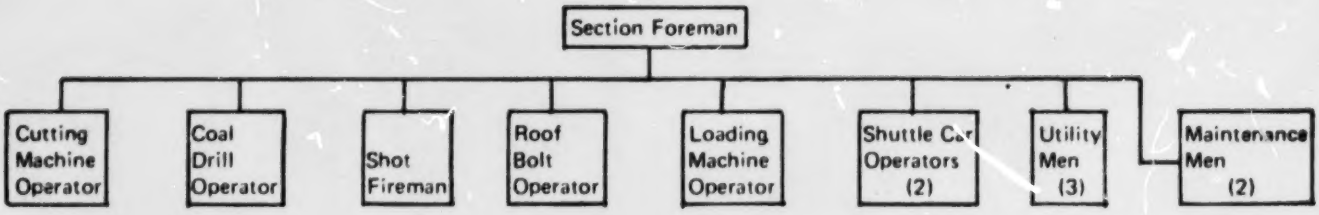


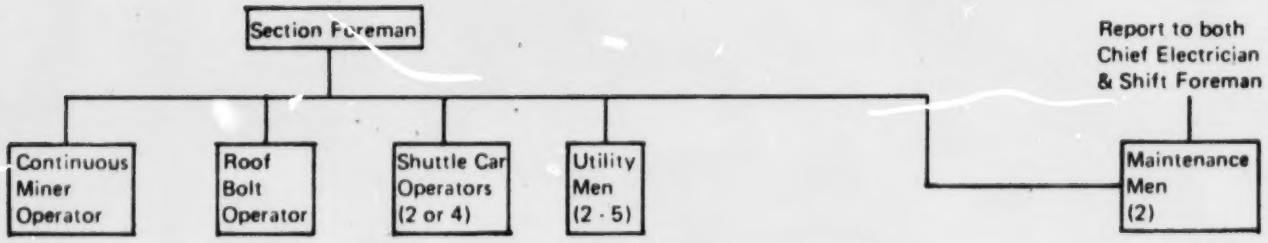
ILLUSTRATION 7

*Source: Jones, E.M. Mining Technology: An Assessment Study for Educational Institutions Involvement in Servicing the Mining Industry. Westmoreland Community College, 1976.

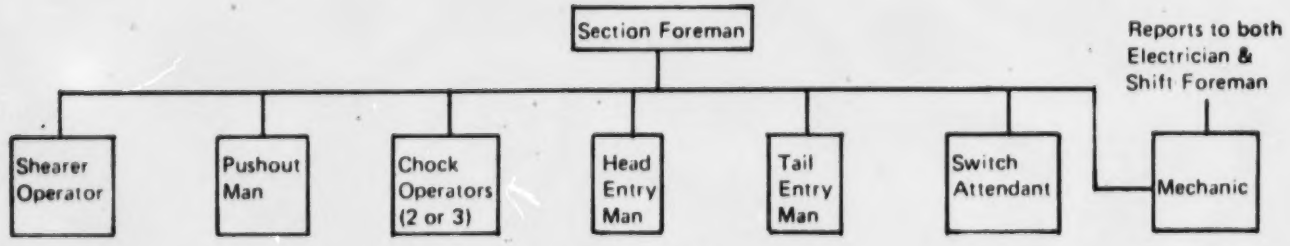
CONVENTIONAL MINE SECTION



CONTINUOUS MINER SECTION


Section Foreman
Report to both Chief Electrician & Shift Foreman
Continuous Miner Operator
Roof Bolt Operator
Shuttle Car Operators (2 or 4)
Utility Men (2 - 5)
Maintenance Men (2)

LONGWALL SECTION



The following list will serve to acquaint the reader with the qualification, certification, and contractual requirements for most of the labor and first line supervisory jobs. References to Pennsylvania State Law are made as an example for discussion purposes. Note that each state has its own certification requirements. This list, of course, should be viewed with some reservation as both state and federal regulations are (constantly) pending revision. When revision occurs, it is likely to entail (more) pre-employment training requirements and more extensive yearly retraining for all personnel.

In this chapter and throughout this report the masculine pronoun refers to both men and women.

MINE FOREMAN

A mine foreman must be certified by the state. Pennsylvania State Law requires him to be a U.S. citizen at least twenty three years old and have five years of underground mining experience with at least three of those years spent within a working section (within one thousand feet of the working face). The Bituminous Coal Mining Laws of Pennsylvania for Underground Mines also make this provision:

> ...that graduates (in the coal mining course of a recognized institution of learning) with a bachelors degree in civil engineering, electrical engineering or mining engineering, or an associate degree in the mining engineering course of a recognized institution of learning may, after examination, be granted certificates of qualification by an examining board as mine foremen and mine electricians, (and mine examiners) if possessed of an aggregate of not less than three years practical experience as miners or men of general work or mining engineers...

As illustrated in Figure Seven, the mine foreman or general foreman oversees the operation of the entire mine. Because of his state certification, the foreman is considered to be qualified by the federal government to the extent of his certification.

SECTION FOREMAN

To hold the job of section foreman an individual must be certified as a mine foreman or an assistant mine foreman. The requirements to become certified as an assistant mine foreman are the same as those of a mine foreman with the following exception: the applicant needs four years inside experience, with three years on working sections. The educational provisions as previously quoted, however, apply, making it possible for a miner with three years experience and appropriate educational credentials to apply for certification. The test given for assistant mine foreman is often the same as that given for mine foreman. The assistant foreman applicant is not required to achieve as high a percentage on the test as is a mine foreman.

MINE EXAMINER

A mine examiner, or "fire boss" as he is commonly called, must be certified. He must have three years experience in working sections of bituminous coal mines. He must also be twenty three years old and a U.S.citizen. He must have had experience in gassy mines and have been instructed in the use and mechanics of all gas detection devices.

The mine examiner usually is the individual responsible for taking methane (gas) readings in the mines, and assuring that all working areas of the mine are safe. He, too, is qualified on the basis of his state certification and takes measurements which are required by federal law to be made by qualified persons.

MINE ELECTRICIAN

This is the job title which leads to much confusion. To become a certified electrician in Pennsylvania, for example, an individual must be a citizen, be twenty three years old, have worked three years in working sections, and had experience in gassy mines. He must have received instruction in the use and maintenance of gas detection devices. Candidates must pass a mine electrician's examination.

In Pennsylvania each mine using electricity underground is required to employ a qualified electrician. If that mine is considered by the state to be gassy the electrician must be certified. Federal law requires that all maintenance on electrical equipment be performed by a qualified individual.

In some states certified electricians are considered to be qualified without federal instruction or testing. Pennsylvania's certified electricians, however, are not automatically approved by the federal government as being qualified.

To become qualified as an electrician the applicant must have had at least one year of experience in performing electrical work, either in a coal mine or in any industry using or manufacturing similar equipment. He must also attend an eighty hour coal mine electrical training program approved by the Mine Enforcement and Safety Administration (MESA) and taught by a MESA approved instructor.

After becoming qualified, an individual must satisfactorily complete an approved coal mine electricians retraining program yearly. It is common in Pennsylvania for a mine to have several qualified individuals and perhaps only one certified. The Pennsylvania State Law requires that the mine electrician "...shall have full charge of the electrical apparatus in the mine, but shall be subject to the authority of the mine foreman." An individual fulfilling the function of mine electrician is often the maintenance foreman, supervising the maintenance crews and also maintenance men on working sections.

HOISTING ENGINEER

The person who operates the electric or steam driven hoist in a shaft mine must be qualified by federal regulations. The requirement for qualification is basically one year's experience working as a hoist operator. Pennsylvania is considering the adoption of certification requirements for hoist operators.

MINER

As one is sure to realize at this point the term miner entails many job classifications. To work as a miner an individual must have a certificate issued by the state. A certified miner is said to have his "papers." Pennsylvania defines the term miner for the purpose of specifying who is required to be certified as follows:

> ...Only underground workers in bituminous coal mines who cut, drill, blast, or load coal or rock at the face of an entry, room, pillar, or other working place, or workers who do general work; also timbermen and trackmen whose duties require them to set timbers and lay or repair tracks at the working faces, and motormen, and shuttle car operators, except as hereinafter provided...
>
> ...Supervisory and technically trained employees of the operator whose work contributes only indirectly to mine operations, employees who are not performing the work of a miner as that term is defined (above) in this act, and noncertified miners, shall not be required to possess a miner's certificate...

When an individual is employed by a coal company in a UMWA mine, he first undergoes a training program lasting at least four days. The fourteen elements taught are outlined in the National Bituminous Coal Wage Agreement of 1974.

After this four-day orientation program the employee is classified as a trainee and is permitted to work in the mine. However, the trainee may not work on or operate any mining equipment or work with medium (301 to 650 volts) or high voltage (more than 650 volts) electricity. He must be within sight and sound of another employee for ninety (working) days, then after the ninety day trainee period the UMWA contract permits him to bid on any job which arises.

Each state establishes the length of experience required for a trainee to become a certified miner. Pennsylvania requires one year of experience before an individual can obtain his miner's papers. During this year, the new employee must work under the direction of a certified miner.

Because seniority is considered in the awarding of jobs an employee is often not able to advance to a new job for one or two years after employment. The employment classifications for each pay grade are listed in Table 1, 2, and 3 (These figures may be updated by contacting the United Mine Workers of America.)

TABLE 1

UNDERGROUND AT DEEP MINES

GRADE 5

DAILY WAGE RATE: 12/6/76 $58.92/day

CLASSIFICATIONS:

A. Continuous Mining Machine Operator
B. Electrician
C. Mechanic
D. Fireboss
E. Longwall Machine Operator
F. Welder, First Class
G. Roof Bolter

GRADE 4

DAILY WAGE RATE: 12/6/76 $55.68/day

CLASSIFICATIONS:

A. Cutting Machine Operator
B. Dispatcher
C. Loading Machine Operator
D. Machine Operator Helper
E. General Inside Repairman & Welder
F. Rock Driller
G. Continuous Miner Helper-Trainee
H. Roof Bolter Helper-Trainee
I. Maintenance Trainee (max. 12 mos.)
J. Electrician Trainee (max. 12 mos.)

GRADE 3

DAILY WAGE RATE: 12/6/76 $52.74/day

CLASSIFICATIONS:

A. Driller-Coal
B. Shooter
C. Precidion Mason-Construction
D. Faceman
E. Dumper
F. Shuttle Car Operator

GRADE 2

DAILY WAGE RATE: 12/6/76 $50.96/day

CLASSIFICATIONS:

A. Motorman
B. Maintenance Trainee (Max. 6 mos.)
C. Electrician Trainee (max. 6 mos.)
D. Electrician Helper
E. Mechanic Helper

GRADE 1

DAILY WAGE RATE: 12/6/76 $50.38/day

CLASSIFICATIONS:

A. Beltman
B. Bonder
C. Brakeman
D. Bratticeman
E. General Inside Labor
F. Mason
G. Pumper
H. Timberman
I. Trackman
J. Wireman
K. Labor-Unskilled

TABLE 2

STRIP AND AUGER MINES

GRADE 5

DAILY WAGE RATE: 12/6/76 $58.92/day

CLASSIFICATIONS:
- A. Coal Loading Shovel Operator
- B. Overburden Stripping Machine
- C. Master Electrician

GRADE 4

DAILY WAGE RATE: 12/6/76 $54.20/day

CLASSIFICATIONS:
- A. Electrician
- B. Machinist
- C. Mechanic
- D. Welder, First Class
- E. Shovel & Dragline Oiler
- F. Groundman

GRADE 3

DAILY WAGE RATE: 12/6/76 $51.56/day

CLASSIFICATIONS:
- A. Mobile Equipment Operator
- B. Repairman
- C. Stationary Equipment Operator
- D. Welder
- E. Driller & Shooter
- F. Maintenance Trainee (max. 12 mos.)
- G. Electrician Trainee (max. 12 mos.)

GRADE 2

DAILY WAGE RATE: 12/6/76 $49.49/day

CLASSIFICATIONS:
- A. Tipple Attendant
- B. Electrician Helper
- C. Mechanic Helper
- D. Machinist Helper
- E. Repairman Helper
- F. Deck Hand, Boat
- G. Dock Hand
- H. Maintenance Trainee (max. 6 mos.)
- I. Electrician Trainee (max. 6 mos.)

GRADE 1

DAILY WAGE RATE: 12/6/76 $48.90/day

CLASSIFICATIONS:
- A. Car Dropper
- B. Car Dumper
- C. Car Trimmer
- D. Sampler
- E. Truck Driver Service
- F. Utility Man
- G. Laborer-Unskilled

TABLE 3

PREPARATION PLANTS AND OTHER SURFACE FACILITIES FOR DEEP OR SURFACE MINES

GRADE 4

DAILY WAGE RATE: 12/6/76 $53.02/day

CLASSIFICATIONS:

A. Electrician
B. Machinist
C. Mechanic
D. Welder, First
E. Preparation Plant Central Control Operator

GRADE 3

DAILY WAGE RATE: 12/6/76 $51.25/day

CLASSIFICATIONS:

A. Mobile Equipment Operatorq
B. Repairman
C. Stationary Equipment Operator
D. Welder
E. Railroad Car Loader Operator
F. Maintenance Trainee
G (max. 12 mos.)
G. Electrician Trainee (max. 12 mos.)

GRADE 2

DAILY WAGE RATE: 12/6/76 $49.20/day

CLASSIFICATIONS:

A. Tipple Attendant
B. Dock Man
C. Electrician Helper
D. Machinist Helper
E. Mechanic Helper
F. Repairman Helper
G. Maintenance Trainee (max. 6 mos.)
H. Electrician Trainee (max. 6 mos.)

GRADE 1

DAILY WAGE RATE: 12/6/76 $48.62/day

CLASSIFICATIONS:

A. Car Dropper
B. Car Dumper
C. Car Trimmer
D. Sampler
E. Bit Sharpener
F. Truck Driver, Service
G. Equipment Operator, Service
H. Preparation Plant, Utility Man
I. Surface Utility Man
J. Laborer-Unskilled

APPENDIX Q

COAL-MINING AND RELATED PROGRAMS*

East

Beckley College
Beckley, W. V.

Bluefield State College
Bluefield, W. V.

Community and Technical College,
West Virginia Institute of Technology
Montgomery, W.V.

Fairmont State College
Fairmont, W.V.

Williamson Campus,
Southern West Virginia Community College
Williamson, W.V.

South

Madisonville Community College
Madisonville, Ky.

Mountain Empire Community College
Big Stone Gap, Va.

Southeast Community College
Cumberland, Ky.

Southeast Community College
Cumberland, Ky.

Southwest Virginia Community College
Richlands, Va.

Midwest

Belmont Technical College
St. Clairsville, Ohio

Wabash Valley College
Mt. Carmel, Ill.

*Source: Doggette, John R. Energy-Related Technology Programs in Community and Junior Colleges: An Analysis of Existing and Planned Programs. Oakridge, Tennessee: Oak Ridge Associated Universities, 1976.

Midwest (continued)

Indiana Vocational Technical College
Indianapolis, Ind.

Rend Lake College
Ina, Ill.

Southeastern Illinois College
Harrisburg, Ill.

North Central

Casper College
Casper, Wy.

Sheridan College
Sheridan, Wy.

Southwest

College of Eastern Utah
Price, Utah